THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIV. No. 584.] LONDON, JULY 21, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov. 2, 1866.*
STEVENS AND CO.,
London Office, 21, Great Winchester Street, E.C.

HENRY SKOINES,
PATENTEE & CONTRACTING GAS ENGINEER
FOR
SETTING RETORTS,
ERECTING AND REMODELLING
GAS-WORKS OF ANY EXTENT,
AT HOME OR ABROAD.
ADDRESS—
7, ARGYLE ST., KING'S CROSS, LONDON, W.C.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.
JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and } LONDON
16, SOHO SQUARE,
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
Lists may be obtained on application to
69, UPPER THAMES STREET, LONDON.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
LONDON AGENT—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

SCOTTISH CANNEL COAL.
J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing gas apparatus and fire-clay goods.
Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
Analysis, prices, and other information will be forwarded on application to their Offices, 8, Forth Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON, or to the "Crown Wharf," Thomas Street, Limehouse, LONDON, where stocks of house, steam, and gas coal are always on hand.
Coal, machinery, fire goods, &c., shipped to all parts of the world.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.

AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.,

PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW; AND 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

LONDON: 157, UPPER THAMES STREET, E.C.

LIVERPOOL: No. 63, Paradise Street. | PARIS: No. 38, Rue du Chateau d'Eau.

MANCHESTER: Barlow's Croft, Chapel Street, Salford. | LILLE: No. 38, Rue Grande Chaussee.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS.

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

VICKARYS AND ROBERTSON,

Late JOHN VICKARY,

ESTABLISHED 1840,

GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,

WEST OF ENGLAND ENGINEERING WORKS, EXETER.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.

GAS-FITTINGS,

Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction.
(A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

HYDRAULIC AND GENERAL ENGINEERING

LONDON OFFICE: 8, JOHN STREET, ADELPHI, W.C.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over twelve years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 9, FENCHURCH STREET, E.C.

JOSEPH AIRD,

WELLINGTON TUBE-WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

PATENT WELDED WROUGHT-IRON GAS, STEAM, HYDRAULIC, GALVANIZED, & ENAMELLED TUBES & FITTINGS.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

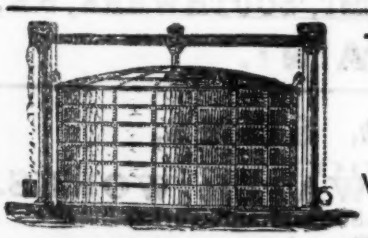
AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS, GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

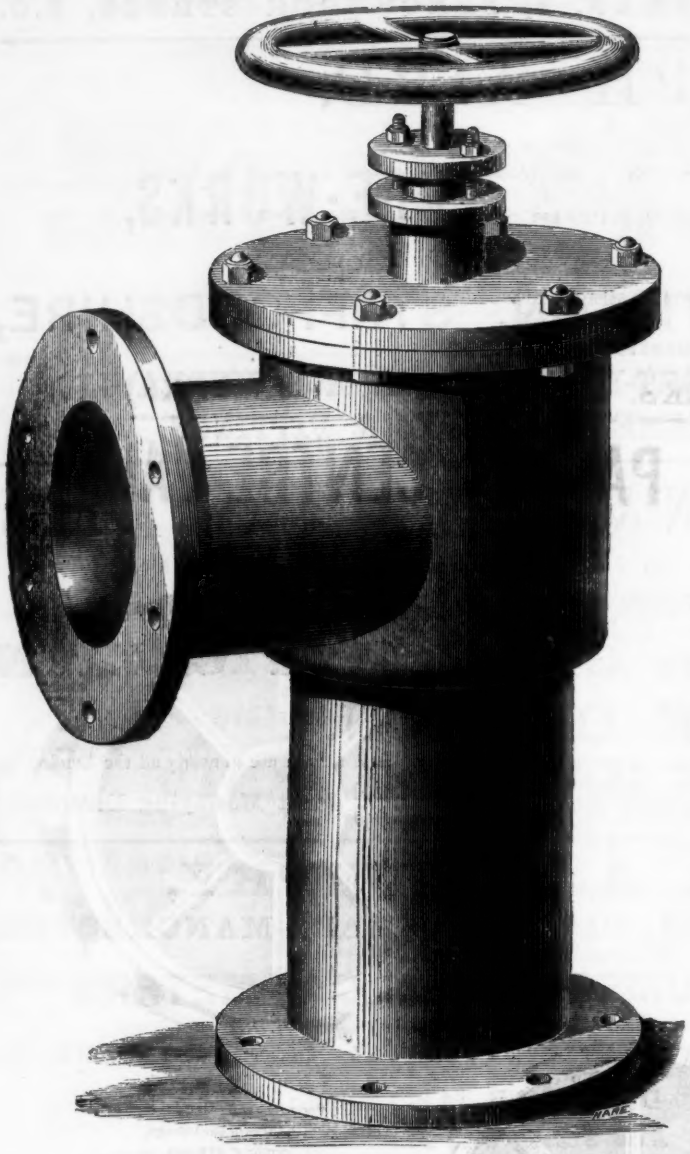
GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

MANUFACTURERS OF

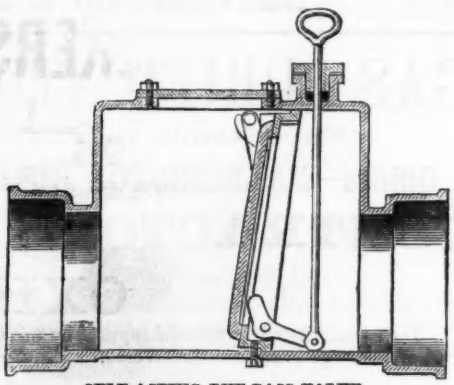
BEALE'S IMPROVED PATENT GAS-EXHAUSTERS,

COMBINED ENGINES AND EXHAUSTERS.

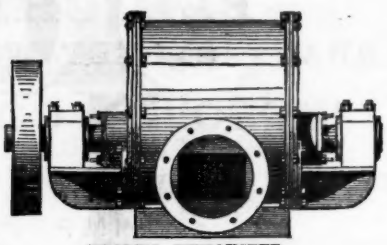


DISC GAS-VALVE.

These Valves have been specially designed by G. Waller and Co. for Beale's Exhausters. They are most effective in action, and have given universal satisfaction. They can also be made with spigot at base, to suit ordinary socket connexions.



SELF-ACTING BYE-PASS VALVE.



BEALE'S EXHAUSTER.

PUMPS, VALVES (2 in. to 30 in.), HYDRAULIC REGULATORS, ENGINES, &c., in STOCK.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,

AND AT

STROUD, GLOUCESTERSHIRE.

JAMES GREGORY AND SONS,

MANUFACTURERS OF EVERY DESCRIPTION OF

STEEL TOOLS FOR GAS & WATER WORKS.

All-Steel Charging and Stoking Shovels, Coke Screens and Forks, Steel Scoops, Picks, Mattocks, Axes, Trowels, &c.

WELDING STEEL RAKE AND SPUD HEADS.

Corporate Mark SOHO Granted 1763.

SUPERIOR CAST-STEEL FILES and SAWS; Solid Cast-Steel Hand and Sledge Hammers.
BEST CAST STEEL for making Chisels, Turning Tools, Taps and Dies, Drills, Snaps, &c.
SINGLE AND DOUBLE SHEAR, Spring, Sheet, and Blister Steel.
SILVER STEEL for Rod-Chisels and Diamond-Points for Cutting Cast-Iron Pipes, and for other work requiring a Special Quality and Temper, and every other description of Steel and Tools as supplied to the largest London Gas Companies, Contractors, and Engineers.

SOHO STEEL-WORKS, SHEFFIELD, & 2, GRESHAM BUILDINGS, BASINGHALL ST., LONDON, E.C.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

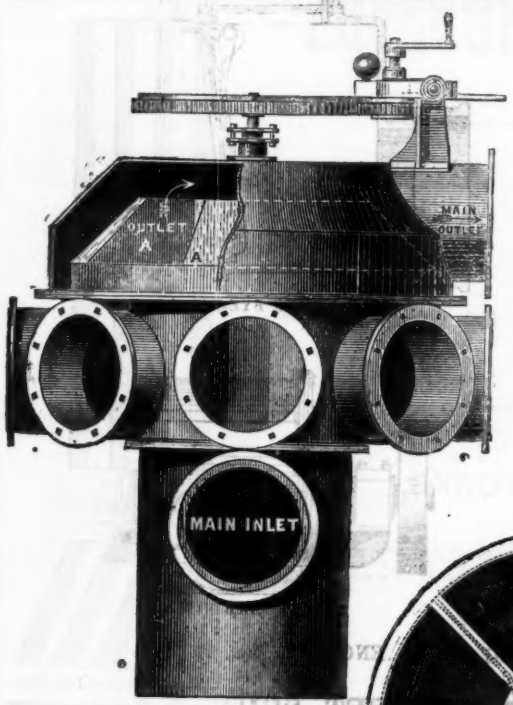
An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

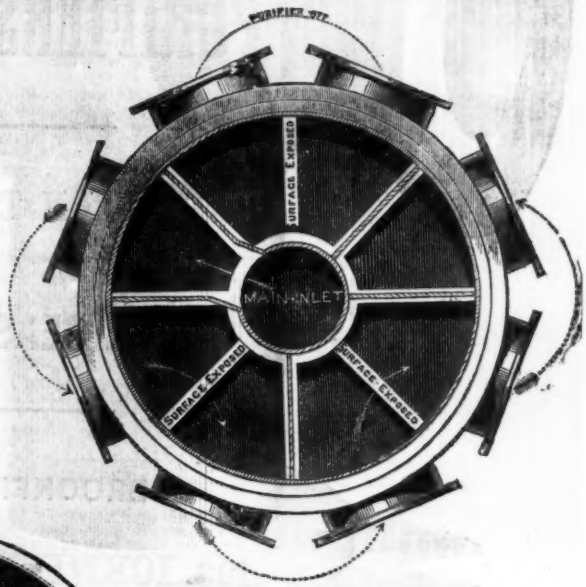
☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

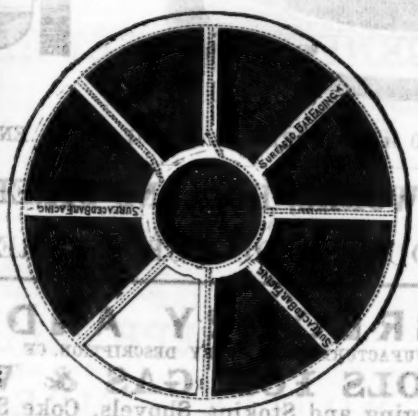
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

ALDER AND MACKAY,

GRANGE WORKS, EDINBURGH,

MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast Iron and Tin Cases,

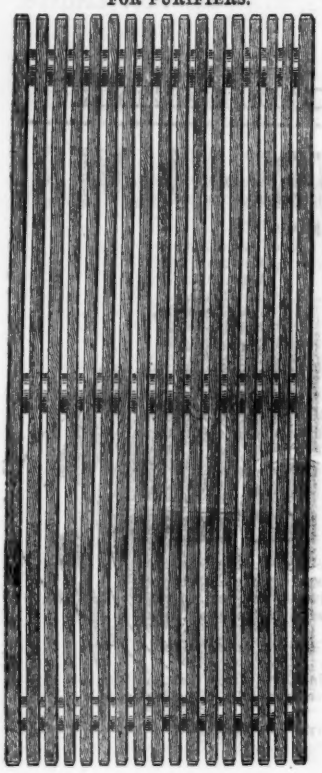
OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

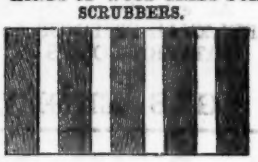
STATION METERS AND GOVERNORS,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c.

PLAN AND SECTION OF WOOD GRID, FOR PURIFIERS.



VERTICAL SECTIONS OF THREE KINDS OF WOOD GRIDS FOR SCRUBBERS.



PROUD'S

SPECIALITIES in WOOD

FOR

PURIFIERS AND SCRUBBERS

MADE FROM THE BEST QUALITY

OF

WELL-SEASONED PLANKS.

BROOKFIELD WORKS,

103, ICKNIELD STREET EAST

BIRMINGHAM.

MADE EITHER TAPER or PARALLEL
With Square or Round Distance Blocks.

Scale, One-Fourth Full Size.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

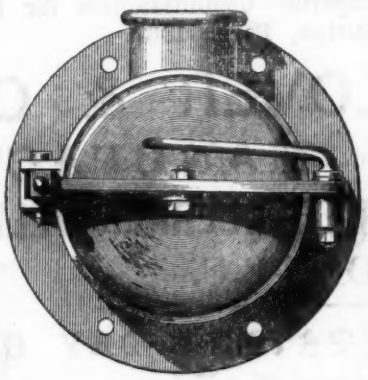
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

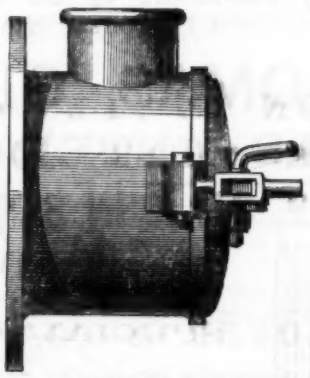
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydf. Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

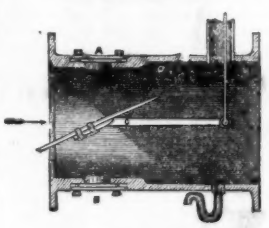
The following important Testimonial, among others, has been given:—

"*The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.*

"Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) "F. J. EVANS."

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

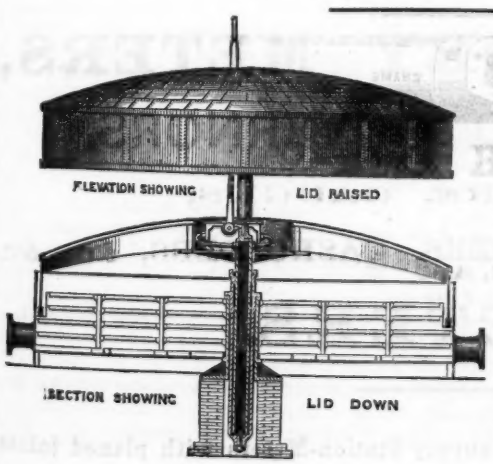
The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Company—a 24 in. at Whitechapel District Station.	The Gaslight Company—a 6 in. at the Gas-Works, Beckton.
" " a 36 in. at Goswell Road Station.	The London Gas Company—an 18 in. at the Gas-Works, Nine Elms.
" " a 24 in. at " "	" " an 8 in. at " "
" " a 24 in. at the Gas-Works, Beckton.	" " a 24 in. at " "

Also at the Gas-Works, Rochdale, Monmouth, Devonport, Cannes, and Mentone (France), &c.



PATENT SELF-CONTAINED

DIRECT HYDRAULIC LIFT

FOR PURIFIER LIDS

REQUIRES NO TRAVELLERS, CRANES, CHAINS, OR OTHER GEAR.

SAFE, SIMPLE, AND DURABLE.

ANY SIZE LID MAY BE RAISED BY ONE MAN.

Eight Hydraulic Lifts have been applied at Beckton Gas-Works to raise the Covers of the large Check Purifiers, which are 40 feet diameter, during the past three years, with perfect success.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF

PATENT WET & DRY METERS,

STATION-METERS AND GOVERNORS,

PRESSURE REGISTERS, GAUGES,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

CONTENTS.

Circular to Gas Companies:— PAGE
The Accounts of the Metropolitan Gas Companies for 1873 . . . 77
Scottish Gas Undertakings . . . 77
Reduction in the Price of Gas at York . . . 77
Gas Deposits and Drawing Accounts . . . 77
Collapse of the Vestry Agitation against the Gas Companies . . . 77
Defective Registration of Meters . . . 77
The Times on Silber Burners . . . 78
Gas Liquor and its Valuation . . . 78
Meeting of the North British Association of Gas Managers . . . 78
Testimonial to Mr. Mann . . . 78
The Average Meter System in the Metropolis . . . 78
Water and Sanitary Notes:—
Consequences of the Drought . . . 78
Water Affairs in Liverpool . . . 78
Another Fire at Chicago . . . 78
The Glasgow Water Supply . . . 79
The Home Secretary on the Disposal of Sewage . . . 79
Irrigation Scheme at Westbury . . . 79
Leading Article:—
A Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas . . . 82
Communicated Articles:—
The Principle of the Valuation of Gas Coal. By D. A. Graham . . . 79
On Gas Liquor and its Valuation. By H. Leicester Greville, F.C.S. . . . 85
Correspondence:—
Horizontal Atmospherical Condensers . . . 85
Gas Purification . . . 85
The Automatic Sewage-Meter . . . 86
Tarry Matter in Gas . . . 86
The Silber Bat's-Wing . . . 86
Improvement in Gas-Meters . . . 86
Silber Burners and Giroud's Rheometer . . . 86
Parliamentary Intelligence:—
Progress of Bills in House of Lords . . . 87
Progress of Bills in House of Commons . . . 87
Legal Intelligence:—
Court of Chancery—
Salvin *v.* North Brancepeth Coal Company . . . 88
Stewart *v.* Lupton . . . 88
Clerkenwell County Court—The Imperial Gas Company *v.* Hammond . . . 89
Hammersmith Police Court—Damage to Gas-Mains by Sewers Contractors . . . 90
Miscellaneous News:—
Thames Valley Drainage . . . 79
Meeting of the European Gas Company . . . 90
Presentation of a Testimonial to Mr. William Mann . . . 91
West of Scotland Association of Gas Managers . . . 92
Mr. Silber's Inventions . . . 95
The Accident at the Sheffield Gas-Works . . . 95
Reductions in the Price of Gas . . . 95
North British Association of Gas Managers . . . 95
Metropolis Gas Supply . . . 96
Metropolis Water Supply . . . 96
Iron and Coal Trades of Sheffield, South Yorkshire, and North Derbyshire . . . 96
The Northern Coal Trade . . . 96
Improved Railway Lamp . . . 96
Dewsbury and Batley Corporation Gas-Works . . . 96
Register of New Patents:—
Silber, A. M.—Lamps and Lanterns . . . 96
Bamber, W.—Gas-Burner . . . 96
Newton, H. E.—Connecting Gas, Water, and other Pipes . . . 97
Manwell, J.—Charging Horizontal Retorts . . . 97
Muir, J. S.—Manufacture of Petroleum Oils, &c. . . . 97
Muir, J. S.—Manufacture of Gas . . . 97
Applications for Letters Patent . . . 97
Grants of Provisional Protection . . . 97
Inventions protected for Six Months . . . 97
Notices to Proceed . . . 97
Patents which have passed the Great Seal . . . 97
Notes and Queries . . . 97

NOTICE TO SUBSCRIBERS.

Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance for the second half of the year 1874, are reminded that this can only be done during the present month.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 21, 1874.

Circular to Gas Companies.

THE abstract of the accounts of the metropolitan gas companies for 1873, which we hasten to present to our readers, has been too recently prepared for us to have had the opportunity of giving it a full and careful study. We must, therefore, defer most of our remarks on the features presented until next week. There are, however, some things on the surface to which immediate attention may be called. The first is the increased cost of coal. In 1872 the mean cost of this prime material to the London companies was 17s. 4d. per ton. Last year it will be seen that the average cost was 24s. 8d. per ton, or an increase of 7s. 4d. per ton. The company who suffered most from the advanced price appears to have been the London, who paid 11s. per ton more than last year. The cost to the Independent was also considerably above the average. If now we turn to the receipts for residual products, to see how far the allegation constantly made is correct, that the increased value of these always compensates for an advance in coal, what do we find? The average increase in the cost of coal we have seen to be 7s. 4d. per ton. Now in 1872 the average receipts for products per ton of coal were 9s. 2d. Last year they rose to 14s. 5d., showing an advanced value of 5s. 3d. per ton of coal, which it will be seen leaves the company 2s. 1d. to the bad, and clearly demonstrates that residuals do not make up for dear coals. The difference of 2s. 1d. per ton of coal is indeed a most important one. Then as regards management, which the agitators allege to be corrupt and extravagant, we find, on comparing the accounts of 1872 and 1873 a considerable reduction in the cost, which is most notable in the case of the much-abused Chartered Company. As regards the efforts of the companies to comply with the requirements of the public in the matter of purification, we notice that those under the Acts 1868-1869 have been involved in a much greater expense for purifying materials. The cost under this head per ton of coal was in 1873 just about double what it was in 1872. Some of the companies, under the Act of 1860 have also gone to a greater relative expense for purification.

The expended capital of the companies now amounts to £10,174,428, showing an addition of, in round numbers, £799,000 in 1873. It is hardly necessary to point out that the profits of 1873, whether calculated on capital, gas-rental, or on the coal carbonized, show a considerable decrease on those of the preceding year.

A paragraph in our "Miscellaneous Intelligence" last week may possibly have escaped notice, and therefore we may draw attention to it here. It related to some Scottish gas undertakings. That at Arbroath belongs to the Corporation, and the report is that the supply of gas last year resulted in a loss of £1347 5s. 8d. The special Act fixes the maximum price at 5s. 10d. per 1000, and the cost of manufacture was actually 6s. 10d. per 1000. The loss has to be made good by a gas-rate in aid, which will amount to 7d. in the pound. Now, if all ratepayers in Arbroath are not gas consumers, it follows that the non-consumers will be made to pay for gas supplied under prime cost, and that possibly some small consumers, who may happen to be heavily rated, will pay out of all proportion. The prices, too, charged by some of the smaller companies are worth remark. A common charge with them appear to be 9s. 2d. per 1000. The gas, of course, is rich, but some could be supplied that would suit the consumers purpose just as well for less than half the money. Lastly, we notice in canny Scotland a gas company declaring a dividend, but having no money to pay it, resolving to borrow the amount required. Some reductions in price are being made by the cannel companies in Scotland, but the charges must continue to rule high, for but a small change has been made in the cost of cannel, and the best seams are being rapidly exhausted.

The York Gas Company, who give one of the cheapest supplies in the kingdom, have announced a reduction from 3s. 4d. to 3s. It is well known that the Corporation greatly covet the undertaking of the company, but if the ratepayers in York are wise they will remain content with the present purveyors of gas.

People who are constantly calling attention to the circumstance that the older statutory gas companies take money on deposit, and do not pay interest thereon, will read with interest the statement of the chairman of the London and Westminster Bank the other day, that they had a balance of £2,000,000, "by which they could earn dividends without paying for it." The bank divided 10 per cent. on the half year. A gas company can at most divide 10 per cent. per annum. We shall be told that there is no analogy between a current account with a bank and a deposit for security with a gas company, but there really is more than appears at first sight. It must be said, too, that the London and Westminster is, we believe, the only joint-stock bank which does not pay interest on balances when they exceed a certain amount.

We informed our readers last week that the delegates from the metropolitan Vestries and District Boards, who were deputed to settle the gas question, have given up the business, and turned it over to the Metropolitan Board of Works. Their action is supported by one District Board, that of Holborn, who have addressed a letter to the Metropolitan Board, recommending them to purchase the gas companies. What course will be suggested by the committee now considering the question we cannot pretend to guess, but we may be certain that none of the impracticable schemes brought forward in resolutions by delegates at the conference will receive the support of the shrewd business men composing, for the most part, the Metropolitan Board.

A curious case, illustrating the necessity for a careful examination of the registering apparatus of meters, on which we remarked some time ago, was heard at Clerkenwell last week, and a full report of the proceedings will be found in another column. It was shown that the wheel of the 100,000 dial had 63 teeth, whereas it ought only to have had 60; the consequence being a deficient registration to the extent of 5000 feet in every revolution supposed to indicate the consumption of 100,000 feet. Now, it is impossible to assume that this is a unique case; there are, probably, a good many meters the wheels of which have too many teeth. On the other hand, the Warden of the Standards has given instances in which the number of teeth was deficient, and the error the other

way. It would seem, then, that besides the measuring capacity, the registering apparatus should be examined before a meter is stamped; but for this latter examination the law does not provide.

Some remarks in what is called the "leading journal," *à propos* to the Silber burners, deserve some notice at our hands. On the assumption, which may or may not be true, that these burners give, with the gas of the Imperial Company and a consumption of 5 feet per hour, a light equal to 20 sperm candles, the writer argues that the first effect of their use will be to produce a considerable deterioration in the quality of London gas, with a corresponding increase in the profits of the gas companies. The assertion must be founded on a belief that the Silber will be adopted as the test burner, of which no one at present dreams. If its superiority should be established, the gas companies may with propriety ask that the new burner may be adopted, since they are legally entitled to the use of the burner which will evolve the largest amount of light, and is adapted for the use of ordinary consumers. That, however, is a consideration for the future, and the event must depend on the action taken by the gas companies and the referees. Supposing, however, the new burner adopted, what deterioration could result? If the gas fulfilled the statutory requirements, nothing more could be desired; and, if gas of the standard quality could be produced for less money, the consumers must reap the advantage, for the profits of gas companies are limited. The consumer alone would in the end reap the benefit. We have a pretty strong opinion that the average composition of London gas is much the same as it was 20 years ago, and what have we arrived at? The gas which formerly gave the light of 12 or 13 candles by the old iron burner, now gives the light of 16 or 17, or indeed 19 or 20 candles by the new London, and meanwhile gas has become cheaper and cheaper. The downward progress of the price has been rudely checked, probably for ever, and therefore companies and consumers may be alike grateful for such inventions as the new London and Silber burners, which give them an increased amount of light with the same article. As regards the latter, we need only say that we simply fulfil the first and most important duty of journalists in bringing to the notice of our readers an invention for which great merits are claimed. It may now be in the hands of all interested in the question, and it must stand or fall according to its deserts.

The paper by Mr. Greville, on "Gas Liquor and its Valuation," which we publish to-day, relates to a matter of considerable importance to gas companies. The author makes it clear that the acid test of the strength of liquor is not always a fair one. He gives an instance in which 66 per cent. of the ammonia in a liquor was fixed, and, therefore, lost to the gas company, although valuable to the ammonia maker. Such cases, we have reason to believe, are not rare, and they suggest that, whenever the gravity and the acid test do not agree, the fair way of making a valuation would be to determine the amount of real ammonia by distilling the liquor with a caustic alkali. As Mr. Greville promises to return to this matter, we shall not pursue it further.

The annual meeting of the North British Association of Gas Managers was held at Glasgow last week, under the presidency of Mr. Foulis, who, on opening the proceedings, delivered an excellent address. The papers read, of which we shall in future numbers give full reports, were on "A Self-acting Seal for Ascension-Pipes, and Improvements in Hydraulic Mains," by Mr. J. Alexander; on "The Economic Results from the Use of Revivified Lime in the Purification of Coal Gas," by Mr. Joseph Gibb; on "A New Form of Slide-Valve Pump, specially adapted for Heavy or Thick Tar," &c., by Mr. D. M. Nelson; on "An Improved Hydraulic Dip-Pipe," by Mr. George Boyd; and on "Stoppages in Ascension and other Pipes: their Causes, Remedies, and Relative Advantages," by Mr. A. Malam. After the reading of the papers, a lecture "On the Influence of Pressure on the Photogenic Value of Coal Gas, and on a New System of Photometry," was delivered by Dr. Wm. Wallace.

We chronicle with much pleasure the fact that the leading metropolitan gas engineers and others have joined in presenting a valuable testimonial to Mr. Mann, the late superintendent of the Blackfriars station of The Gaslight and Coke Company, whose retirement has been forced upon him by the closing of the works as a manufacturing establishment. Mr. Mann is well known by his writings on gas matters, and his inventions, particularly his scrubber; but by all those who have the pleasure of his personal acquaintance he is even more highly appreciated for the urbanity which accompanies his intelligence, a trait in his character properly remarked upon by Mr. R. Jones. Qualities such as Mr. Mann possesses are certain to be valued, and the handsome present made on Wednesday last is as honourable to the donors as it was deserved by the recipient.

A paragraph in the last "Circular," with reference to the introduction of the average meter system into London, stated that the vestry of Paddington were advertising for contracts for the supply of the meters, including the cost of inspection and repairs. It appears, however, that the contract for the meters was entered into some months ago, and that arrangements have been made to have everything in readiness so as to commence operations on the 1st of October next. The contracts now being advertised are for the repairing and painting of the lamps and posts. Although nothing is at present settled, there is a probability that this parish, as well as the parish of St. Pancras, will undertake the lighting and extinguishing of the lamps themselves. Messrs. W. Parkinson and Co., of Cottage Lane, City Road, are carrying out the contracts in both parishes for the supply of meters. Their contract in Paddington is for 140 meters (being one to every twelfth lamp), and for the supply of new taps and regulators to all the lamps. In St. Pancras they are supplying 280 meters (being in the same proportion to the number of lamps), with new taps and regulators to all the lamps. The meters are of the wet class, in cast-iron cases, and these again will be enclosed in cast-iron air-tight boxes.

Water and Sanitary Notes.

The lovely summer weather—everything that can be desired for the ripening and gathering of the cereal crops—is, however, producing a serious amount of discomfort and inconvenience in the north of England and in Scotland, in consequence of deficient rainfall. The Corporation of Manchester have found it advisable to urge on consumers the necessity of economizing the use of water to the greatest extent possible, in order that they may be able to maintain the constant supply, which cannot be kept up much longer if the drought continue. At Birstal the Local Board have issued a notice that no water can now be supplied for trade purposes, and announce their intention to prosecute any person who shall take water for other than domestic use. They also threaten to proceed against any one who wastes water by having a cistern, pipe, or tap out of repair, or who takes water without having entered into a proper contract with the Board. They have gone further, and invite the aid of informers, to whom they promise half the penalties imposed. The supply to Birstal is bought of the Bradford Corporation, whose reservoirs are very low. The Town Council of Wolverhampton are very loth to own to any deficiency of water; but they, too, have found it necessary to appeal to the inhabitants to be as economical as possible in its use. In Leeds, of course, a deficiency continues, and the medical officer makes earnest appeals to the Town Council for a further supply, which it is impossible to give. At Liverpool the service, though not perhaps deficient, can hardly be said to be satisfactory. All the out-townships and a portion of the borough get a constant supply, but the larger part of the borough has only a supply for 10½ hours daily; the borough, in fact, seems to be sacrificed for the benefit of the out-townships. At a recent meeting of the Water Committee, the chairman gave some approximate calculations as to the cost of the water supply:—

He had taken the gross income of the Water Committee and deducted the amount paid by Chorley, the amount paid for meter-rent, and the sum paid by the borough fund. The gross amount received by the committee was £165,000 a year, and, deducting from it those two sums, there remained £158,500. Then he found that the actual cost of the water was £24 per million gallons. The domestic consumption of Liverpool was 105,179,000 gallons. Trade consumed 17 millions, shipping 471,000, baths and washhouses 850,000, fires 1 million, sewers 1 million, and watering the streets 500,000. Taking these supplies, and charging £24 per million, the following was the result:—The domestic ought to pay £132,040, whereas it paid £98,000; trade should pay £21,216, whilst it actually paid £32,600; shipping should pay £629, whereas it paid £10,243; and public purposes should pay £4680, for which £2500 was received from the borough fund. The outside of the borough paid £17,000, whereas it should pay £22,600; the inside paid £81,000, where it should pay £109,352. Taking a given quantity of water per head as covering the inside and outside of the borough, the water engineer and himself were convinced that whereas 24½ gallons more than covered the borough, it was a long way short of what was taken outside.

The Corporation are about to expend from 1½ to 2 millions in adding to the water supply, for which the borough alone is responsible; but, before they do this, it is certainly advisable to establish some equality in the rating. At present 1s. 4d. in the pound is paid in the borough, and only 9d. outside.

A large portion of Chicago has again been destroyed by fire. That such a catastrophe should happen in a city so well supplied with water argues a very inefficient fire service. Fires in Chicago are really more disastrous than in Constantinople and Smyrna, where a water supply, in the modern sense, is unknown. But in Chicago the water supply in 1872 averaged about 80 American gallons daily per head of population, and the distribution is constant under pressure. If, however, people will build narrow streets of wooden houses, they must submit to occurrences of this kind now and then. The immunity we enjoy in London from widespread conflagrations depends more on brick walls and tiled roofs than water. With good party walls a fire might in many cases be left to burn itself out, without damaging neighbouring property and wasting water. While on this matter we may express some

regret that the Metropolitan Board have decided on withdrawing the Metropolis Buildings Bill. It certainly required some amendment; but, on the whole, it was a well-considered measure, and we hope that with the necessary alterations it will be reintroduced to Parliament next year.

Recent rains have filled Loch Katrine to the top water level again, and Glasgow has at that source a sufficient water supply for 106 days—that is, for the district it supplies. We are not told what stock is on hand at the Gorbals works, but we fancy it must be short. Water is very scarce in Lesmahago, where the people have to cart it in barrels for considerable distances, but the local authority appear to be making praiseworthy exertions to prevent deficiency in future.

A deputation recently waited on the Home Secretary to recommend the formation of Conservancy Boards for the rivers Irwell and Mersey. Both are, no doubt, in a very filthy state, the Irwell especially, which is said to be silting up with refuse. Mr. Cross, in reply, sensibly stated that—

> No one yet had thoroughly solved the question what ought to be done with the sewage of great towns. Till that question was solved it was difficult to say what was to be done. He quite agreed with the deputation that a great deal might be done immediately; but, at the same time, he thought a great deal of money had been wasted upon sewage schemes which would turn out to be perfectly useless. If they had a strong Conservancy Board it would enforce increased rates and increased expenditure. That it was right to do if they were sure they could accomplish their object; but public opinion must first be satisfied that the scheme for dealing with sewage would answer.

A strong Conservancy Board would probably harass every industry and town along the banks of the rivers, and do much more harm than good. The question of the disposal of sewage is not yet ripe for legislation. We are still in the hands of doctrinaires and schemers. Truth will be learned from the experiments of both, but it will cost a good deal of money. In the course of a quarter of a century we may, perhaps, be able to say what it is best to do with sewage; and till we know that, legislation may be delayed.

An irrigation experiment on a small scale is likely to be made at Westbury-on-Trym. The sewage to be disposed of is about 60,000 gallons a day, but we are not told the area of the land to which it is to be applied.

Communicated Article.

THE PRINCIPLE OF THE VALUATION OF GAS COAL.

By D. A. Graham, Stalybridge.

(*Continued from p.* 13.)

We have shown how the values of the lengths of the co-ordinates, expressing the values of the candles and the returns per ton, may be determined from the selection of a few cases, and calculating their values from the values assigned to the particular coal and cannel selected.

We shall now proceed to examine a constructive method of obtaining these values, which might conveniently be substituted for the arithmetical formulæ for obtaining them—although, unless large scales were used, they could not be applied to obtain these numbers so accurately as they might be found by calculation.

In fig. 1, let the rectangle H J M L represent the illuminating power of this coal, multiplied by its productive power—that is, let M J = 12 candles: and L M = 9000 cubic feet, and let the rectangle M B D O represent the illuminating power of this cannel, multiplied by its production per ton—that is, let M B = 22 candles and M O = 10,000 cubic feet.

Bisect L M and M O, then will P N be equal to the production of half a ton of this coal, *plus* half a ton of this cannel. Draw the vertical lines P A and N C, and from A—the point where D B produced intersects the vertical line P A, draw the diagonal line A K; and at the point where it cuts M B, at the point U, draw E G parallel to P N, then will the rectangle P E G N represent the production per ton, multiplied by the illuminating power of half and half of this coal and cannel—for the rectangle E U J I is equal in area to the rectangle B C G U, therefore P I J M + M B C N is equal to P E G N.

Make J W = I J, and draw the straight line A W; it will bisect the line B J in the point F, and, had the cannel produced 9000 cubic feet as well as this coal, would have shown that the diagonal line which joined the values of the candles would have been straight, and necessarily vertical; but the greater the divergence of the make per ton, the greater will be the curvature of the curve which joins their extremes, and it will be evident that the converse will also be true—that the nearer the makes per ton approach each other, the nearer will this diagonal approach to a straight line.

M U will, therefore, represent the value of the illuminating power of this mixture of half and half; and had the makes been equal, M F would have represented their value, so that F U will represent the vertical difference between the values of the lengths of the ordinates, showing the value for the diagonal straight line and the curved line.

Doubling or halving, or taking any other multiple or submultiple of these values, will not alter the relations they bear to each other, for let A B be bisected in the point Q and B C be bisected in the point R, then will the diagonal line, Q V, pass through the point U, and the value of J U may therefore be found from either of the following formulæ:

$$\text{K J} : \text{J U} :: \text{K I} : \text{I A}$$
$$\text{or, V J} : \text{J U} :: \text{V T} : \text{T Q}$$

In the same manner, it could be proved that F M and M F in fig. 2 would represent the values of the production per ton, and the illuminating power of a mixture of two of this coal to one of this cannel, and F J must therefore be the measure of a point beyond the straight diagonal line; for M N is greater than one-half of P M, and this must be true of all other points in the curve with the exception of its extremes.

We have shown how multiples or sub-multiples may be used indifferently to find these values, and it will be obvious that the larger the scale used the more likely will it be that the results obtained will be accurate.

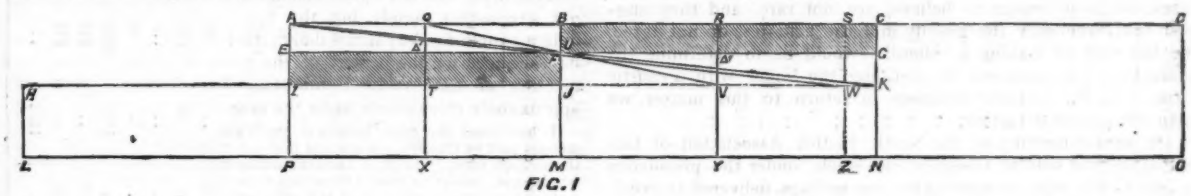


FIG. 1

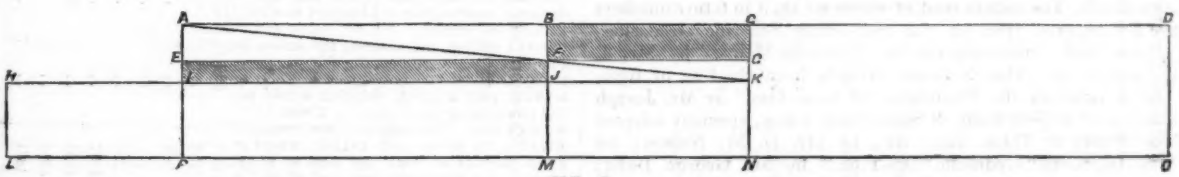
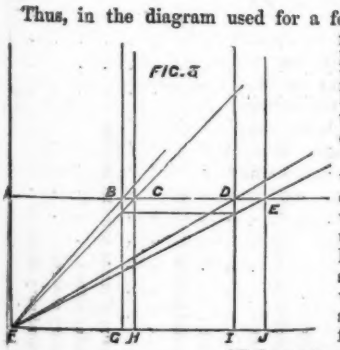


FIG. 2

Thus, in the diagram used for a former illustration, let F B in fig. 3 represent the curved line there represented, and F C a part of the diagonal line; and let A D be *double* the value of A B, and A E equal 2 A C.



Then will the ratios and values be the same, whether one scale be used to measure vertical, and another scale be used to measure horizontal lines, or whether the same scale be retained for both—which method (of using two scales) we may apply in some future illustration.

(*To be continued.*)

Thames Valley Drainage.—On Thursday, July 16, a deputation, consisting of representatives of Kingston-upon-Thames, Surbiton Improvement Commission, and the Hampton Wick Local Board, waited upon the President of the Local Government Board, with the view of getting the Government to take some steps to relieve themselves and other places in the valley of the Thames of the difficulties of dealing with their sewage. They pointed out that under the Towns Improvements Act they had been compelled to deal with their sewage; that sewage irrigation had been recommended, and large sums of money had been spent, but owing to the difficulty of obtaining land (the land in the neighbourhood being building land and public park land), they could not obtain effluent water of the standard required by the Thames Conservancy for allowing it to flow into the Thames. They were now under a penalty of £100 per day; and but for the forbearance of the Thames Conservators, who were waiting for something to be done, it might be a still more serious pecuniary matter. What they wanted was a commission to be issued by the Government to report on a scheme of a comprehensive character, and make a compulsory union of the different bodies to carry out a proper scheme of drainage. Mr. Marsh, Mr. Wilkinson, Mr. Walpole, and Mr. Nelson (the City solicitor) having spoken, the president in reply said he fully appreciated the difficulties they were in, but at the same time the remedies they suggested were large and comprehensive. He could not answer them on the spur of the moment, but would communicate with them through Sir Henry Peek. When they spoke of a commission inquiring into a scheme of drainage for the places they represented, the question would immediately arise, why should not the same commission include the whole valley of the Thames, at any rate to Windsor? There were many other places, such as Hounslow, Isleworth, and Brentford in the same difficulty, and if they had to wait till the commission reported on all these places, the delay might be very serious. He asked why they had not taken advantage of the provision in the Public Health Act to form themselves into a sanitary district. That would be much better than waiting for the report of a commission on the whole Thames Valley, which, after all, might not be of any practical value.

METROPOLIS GAS COMPANIES, 1873.

REVENUE ACCOUNT, *compared with that of* 1872, *showing the Increase or Decrease in each Item.*

	Chartered.		Commercial.		Imperial.		Independent.		London.		Phœnix.		Ratcliff.		South Metropolitan.		Surrey Consumers.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Total gas-rental	227596	..	7077	..	48979	..	7600	..	32609	..	18999	..	1179	..	8507	..	8903	..
Common gas	98799	..	6965	..	45473	..	7921	..	29207	..	16475	..	1218	..	8112	..	8481	..
Cannel gas	116828	..	..	..	..	..	..	..	2648	..	..	..	..	..	..	..	..	..
Public lights, including lighting and contracts	11969	..	112	..	3506	..	..	321	755	..	2524	..	..	39	395	..	422	..
Meter-rents	2364	..	..	..	889	..	39	..	85	..	152	..	61	..	..	..	578	..
Old materials	2078	..	530	..	1836	..	..	518	..	170	365	..	..	3	..	519	..	3
Products	115671	..	19158	..	108073	..	17367	..	36273	..	30946	..	5829	..	25136	..	13588	..
Miscellaneous	2212	..	..	9	202	..	..	1	6	..	..	173	76	..	..	144	709	..
Total income from all sources	349922	..	26755	..	159981	..	24487	..	68803	..	50289	..	7142	..	32568	..	23775	..
Total expenditure on revenue account	261228	..	41200	..	185438	..	22315	..	62768	..	50928	..	10944	..	36510	..	21151	..
Gross profit	88694	..	..	14444	..	25458	2171	..	6035	..	..	640	..	3802	..	2875	2624	..
Capital and borrowed money	249033	..	12752	..	398990	..	3722	..	25832	..	55800	..	..	..	28975	..	13699	..
Gross profit per cent. on capital, &c.	1·97	..	..	3·50	..	1·88	0·77	..	0·48	..	..	0·52	..	3·29	..	1·94	0·55	..
Gross profit per cent. on gas-rental	2·33	..	..	10·42	..	6·37	0·64	..	..	2·28	..	3·47	..	12·25	..	6·31	0·11	..

METROPOLIS GAS COMPANIES, 1873.

EXPENDITURE, *compared with that of* 1872, *showing the Increase or Decrease in each Item.*

	Chartered.		Commercial.		Imperial.		Independent.		London.		Phœnix.		Ratcliff.		South Metropolitan.		Surrey Consumers.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Coals, including carriage and dues	191509	..	27556	..	167711	..	24498	..	53284	..	42892	..	6856	..	35950	..	17036	..
Purifying materials	5145	..	..	290	8752	..	..	209	1320	..	..	57	87	..	1223	..	85	..
Supervision, labour, &c.	5380	..	2280	..	..	9622	..	1152	2371	..	771	..	225	..	1744	..	..	496
Repair and maintenance of premises, tools, &c.	23609	..	18204	..	11217	..	..	124	2796	..	9130	..	3506	..	651	..	4539	..
Rents, rates, and taxes	9295	..	..	517	1518	..	..	419	..	1766	915	..	..	83	..	69	..	429
Salaries	..	505	..	105	..	1495	41	..	267	..	261	..	100	..	..	115	4	..
Collectors commission	3199	..	74	..	40	..	..	40	219	..	..	89	12	..	142	..	211	..
Stationery, printing, and general charges	908	..	..	24	1760	..	..	62	1212	..	626	..	..	32	137	..	62	..
Directors	..	710	..	..	..	..	..	..	..	..	..	..	..	..	..	16	75	..
Auditors	290	..	..	..	26	..	..	..	25	..	..	..	..	..	1	..	..	..
Distribution and repairs of mains and services, &c.	4897	..	..	5319	5212	..	164	..	..	497	..	2293	285	..	..	1400	419	..
Restoring and replacing meters	8124	..	377	..	649	..	..	250	549	..	133	..	49	..	..	296	..	253
Law and parliamentary charges	5255	..	87	..	648	..	..	75	..	820	..	1483	..	14	..	1085	208	..
Bad debts and extraordinary expenses	4831	..	..	1122	..	979	..	56	3307	..	122	..	..	47	..	856	..	309

Bad debts and extraordinary expenses . . . . . 4831 .. .. ..

DETAILS OF INCOME, FOR THE YEAR 1873.

Name of Company.	Total Gas-Rental.	Common Gas.	Price per 1000 Cubic Feet.	Cannel Gas, at 3s. 9d. to 6s. 3d. per 1000 Cubic Feet.	Public Lights, including Lighting and Contracts.	Meter-Rents.	Old Materials.	Products.	Miscellaneous.
	£ s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Chartered	928,195 17 6	595,419 12 10	4 4	269,331 17 2	63,444 7 6	10,175 0 0	6793 2 4	285,006 11 7	5,913 16 7
Commercial	157,470 6 5	141,694 3 0	4 0	..	15,776 3 5	None chgd.	1277 15 0	57,650 4 7	190 18 11
Imperial	668,434 8 11	594,263 8 3	3 9	..	74,171 0 8	15,777 17 3	3246 4 0	266,110 16 0	1,762 19 6
Independent	81,556 15 8	75,504 7 4	3/2 & 3/6	..	6,052 8 4	2,593 19 3	364 0 2	46,194 3 4	1,070 3 3
London	214,728 9 0	180,587 9 6	3/9 & 4/6	13,181 0 9	20,959 18 9	3,783 9 9	93 4 8	87,695 11 8	2,940 6 6
Phœnix	232,193 16 2	196,482 18 4	3/9 & 4/0	..	35,710 17 10	5,036 6 1	1074 2 5	89,730 14 3	3,120 12 0
Ratcliff	35,161 13 4	31,375 2 8	3 9	..	3,786 10 8	241 5 0	75 11 9	15,618 2 9	385 14 5
South Metropolitan	105,708 8 11	92,499 17 11	3 0	..	13,217 11 0	None chgd.	157 11 5	62,656 17 2	1,264 7 5
Surrey Consumers	80,952 1 0	67,835 14 0	4/0 & 4/6	..	13,116 7 0	2,121 0 11	155 10 0	34,389 16 7	926 15 5
Total	2,504,401 16 11	1,975,653 13 10	..	282,512 17 11	246,235 5 2	39,728 18 3	13237 1 9	945,052 17 11	17,575 14 0

ABSTRACT OF DETAILS OF INCOME AND EXPENDITURE, SHOWING THE PROFIT REALIZED.

Name of Company.	Total Income from all Sources.	Total Expenditure on Revenue Account.	Gross Profit.	Capital and Borrowed Money.	Gross Profit per Cent. on the Capital and Borrowed Money.	Gross Profit per Cent. on Gas-Rental.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Chartered	1,236,084 8 0	940,883 8 6	295,200 19 6	3,763,304 0 0	7·84	31·80
Commercial	216,589 4 11	187,076 17 4	29,512 7 7	450,000 0 0	6·55	18·74
Imperial	955,332 5 8	764,005 10 10	191,326 14 10	3,072,415 0 0	6·22	28·62
Independent	131,779 1 8	113,538 3 1	18,240 18 7	252,222 0 0	7·23	22·36
London	309,241 1 7	242,174 2 2	67,066 19 5	855,694 12 6	7·83	31·23
Phœnix	331,155 10 11	248,592 4 6	82,563 6 5	1,026,800 0 0	8·04	35·55
Ratcliff	51,482 7 3	40,956 3 3	10,546 4 0	115,670 0 0	9·11	29·99
South Metropolitan	169,787 4 11	142,539 11 4	27,247 13 7	348,975 10 0	7·80	25·77
Surrey Consumers	118,545 3 11	95,465 16 5	23,079 7 6	289,347 16 5	7·97	28·50
Total	3,519,996 8 10	2,775,211 17 5	744,784 11 5	10,174,428 18 11	7·62	28·06
					Average.	

DETAILS OF EXPENDITURE ON REVENUE ACCOUNT, FOR THE YEAR 1873.

Name of Company.	Coals, including Carriage and Dues.	Purifying Materials.	Supervision and Labour in Manufacture.	Ordinary Repair and Maintenance of Premises, Tools, and other Implements.	Rents, Rates, and Taxes.	Salaries, Management.	Collectors Commission.	Stationery, Printing, and General Charges.	Directors.	Auditors.	Expense of Distribution & Ordinary Repairs of Mains and Services, Lighting & Repairing Lamps.	Restoring and Replacing Meters.	Law and Parliamentary Charges.	Bad Debts and Extraordinary Expenses.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Chartered	597,191 12 8	14,422 18 11	93,726 15 9	76,663 18 5	32,716 11 9	4,922 10 0	11,774 16 3	6,644 14 0	5,000 0 0	500 0 0	45,691 4 8	20,602 10 2	9,274 12 8	23,751 3 3
Commercial	111,846 4 1	1,572 0 11	18,886 4 0	24,770 2 1	3,758 0 1	1,523 0 0	1,522 9 0	1,462 17 4	1,500 0 0	150 0 0	16,837 2 7	1,586 16 4	156 2 4	1,505 18 7
Imperial	499 528 13 10	15,204 5 2	70,006 19 8	78,786 11 0	17,150 10 4	8,412 5 3	9,841 12 8	6,901 16 8	4,000 0 0	183 15 0	36,182 12 5	11,154 1 5	895 15 6	5,756 11 11
Independent	77,219 16 11	352 9 9	13,097 1 1	8,321 16 0	2,291 1 9	1,364 15 0	1,408 11 4	748 19 2	1,700 0 0	100 0 0	5,243 14 5	1,127 5 3	13 10 0	549 2 5
London	143 832 9 6	2,507 18 4	25,510 3 8	23,669 15 5	7,633 18 7	1,763 4 0	2,820 10 0	2,498 1 7	1,800 0 0	125 0 0	11,207 6 10	3,817 19 0	172 3 2	14,815 12 1*
Phœnix	150 719 3 1	2,664 19 0	22,193 9 1	31,398 16 8	9,401 18 1	2,426 6 3	3,406 13 6	3,411 3 6	2,000 0 0	100 0 0	14,810 5 2	4,198 3 9	11 9 0	1,849 17 5
Ratcliff	23,552 10 10	179 6 8	4,661 18 11	5,705 3 2	1,232 4 3	773 0 0	349 5 0	301 10 1	800 0 0	81 10 0	2,373 2 2	582 13 5	..	393 18 9
South Metropolitan	94 859 2 7	2,130 1 1	17,261 3 6	5,954 3 1	4,432 5 11	1,500 0 0	1,597 7 5	1,454 7 9	1,183 15 0	98 12 11	8,855 17 6	1,993 17 1	..	1,218 17 6
Surrey Consumers	54,966 7 4	747 9 10	9,098 16 11	11,949 13 11	2,968 9 1	998 16 0	889 18 1	798 8 4	1,500 0 0	84 0 0	7,647 13 11	504 10 9	272 9 1	3,039 3 2
Total	1,753,716 0 10	39,781 9 8	274,442 12 7	267,219 19 9	81,584 19 10	23,683 16 6	33,611 3 3	22,221 18 5	19,483 15 0	1,372 17 11	148,848 19 8	45,567 17 2	10,796 1 9	52,880 5 1

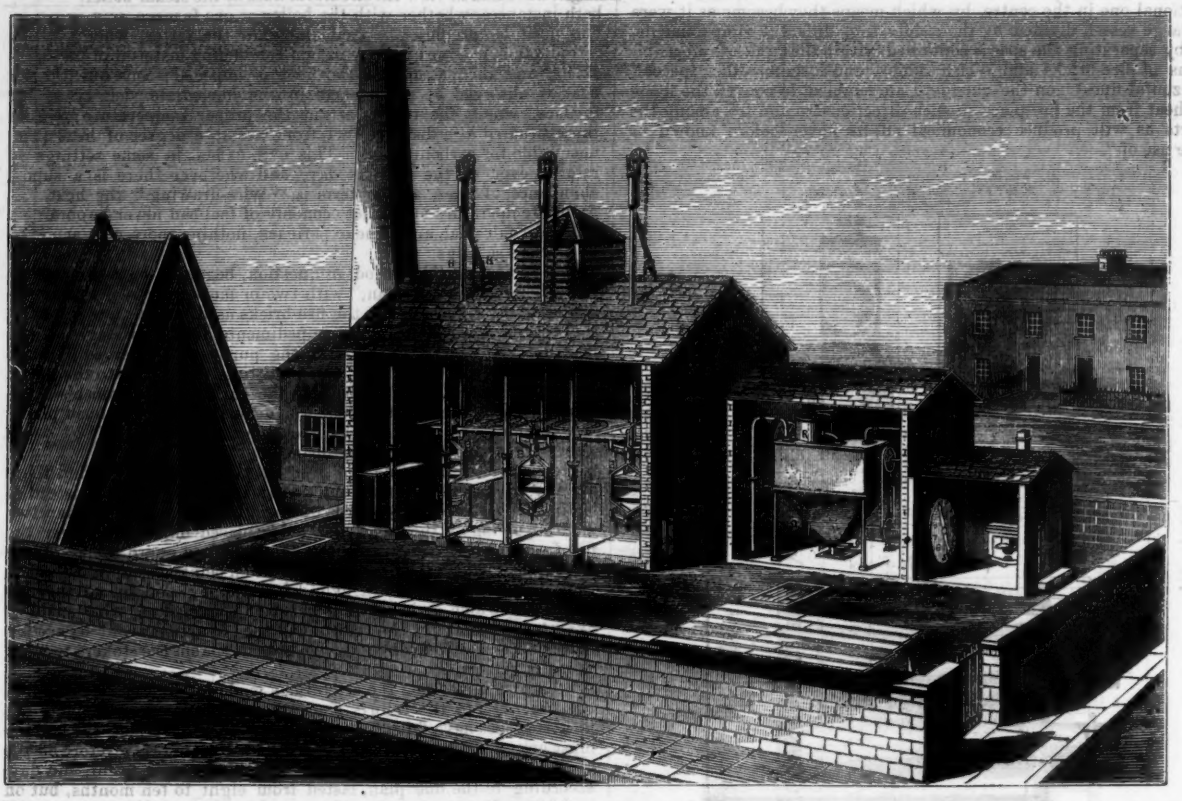
* This item includes the sum of £12,759 17s. 3d. paid to the Chartered Company for cannel gas supplied in bulk, at 3s. 9d. and 4s. 7d. per 1000 cubic feet.

TABLE *showing the Income, Expenditure, Profit, and Capital of the Metropolis Gas Companies per Ton of Coal carbonized in* 1873.

	INCOME.						EXPENDITURE.												PROFIT.	CAPITAL.
Name of Company.	Total Gas-Rental.	Meter-Rents.	Old Materials.	Products.	Miscellaneous	Total Income from all Sources.	Coals, including Carriage and Dues.	Purifying Materials.	Supervision and Labour in the Manufacture of Gas.	Ord. Repair & maintenance of Premises, Tools, & other Implements.	Rents, Rates, and Taxes.	Salaries, Management.	Collectors Commission.	Stationery, Printing, and General Charges.	Directors.	Auditors.	Expense of Distribution & Ordinary Repairs of Mains and Services, Lighting & Repairing Lamps.	Restoring and Replacing Meters.	Law and Parliamentary Charges.	Bad Debts, and Extraordinary Expenses.	Total Expenditure on Revenue Account.	Gross Profit per Ton of Coal carbonized.	Capital and Borrowed Money per Ton of Coal carbonized.
	s. d.	d.	d.	s. d.	d.	s. d.	s. d.	d.	s. d.	s. d.	s. d.	d.	d.	d.	d.	d.	s. d.	d.	d.	s. d.	s. d.	s. d.	£ s. d.
Chartered	38 2·60	5·02	8·35	11 8·81	2·91	50 10·72	24 7·06	7·12	3 10·30	3 1·87	1 4·16	2 4·3	5·81	2·29	2·47	0·24	1 10·57	10·17	4·58	0 11·73	38 8·87	12 1·85	7 14 11·37
Commercial	35 6·12	..	3·45	13 0·00	0·51	48 10·10	25 2·66	4·25	4 2·10	5 7·02	0 10·16	4·10	4·09	3·95	4·05	0·40	3 9·56	4·29	0·42	0 4·07	42 2·24	6 7·86	5 1 5·72
Imperial	32 3·33	9·14	1·88	12 10·20	1·01	46 1·58	24 1·45	8·81	3 4·56	3 9·65	0 9·93	4·87	5·70	3·99	2·31	0·10	1 8·96	6·46	0·51	0 3·33	36 10·71	9 2·86	7 8 4·35
Independent	28 7·15	10·09	1·53	16 2·36	4·50	46 2·46	27 0·90	1·48	4 7·10	2 11·01	0 9·63	5·07	5·92	3·15	7·15	0·42	1 10·06	4·74	0·05	0 2·31	39 9·71	6 4·74	4 8 5·22
London	40 4·25	8·53	0·21	16 5·77	6·63	58 1·38	27 0·37	5·65	4 9·53	4 5·37	1 5·21	3·97	6·36	5·63	4·05	0·28	2 1·27	8·61	0·38	2 9·41	45 6·14	12 7·24	8 0 9·75
Phœnix	34 2·07	8·89	1·89	13 2·47	5·51	48 8·85	22 2·09	4·70	3 5·19	4 7·45	1 4·60	4·28	6·01	6·02	3·53	0·17	2 2·15	7·41	0·01	0 3·26	36 7·04	12 1·81	7 11 1·44
Ratcliff	35 8·56	2·94	0·92	15 10·35	4·70	52 3·48	23 11·06	2·18	4 8·82	5 9·53	1 3·01	2·41	4·25	3·67	9·74	0·38	2 4·92	7·10	..	0 4·80	41 6·94	10 8·54	5 17 5·62
South Metropolitan	27 8·50	..	0·40	16 5·08	3·97	44 6·06	24 10·37	6·70	4 6·29	1 6·72	1 1·94	4·71	5·02	4·57	3·72	0·31	2 3·85	6·27	..	0 3·83	37 4·35	7 1·70	4 11 5·69
Surrey Consumers	34 5·69	10·83	0·79	14 7·75	4·73	50 5·68	23 4·84	3·82	3 10·48	5 1·65	1 3·16	5·10	4·54	4·07	7·66	0·42	3 3·07	2·57	1·39	1 3·52	40 7·76	9 9·91	6 3 2·37
Average	34 1·35	7·92	1·60	14 5·86	3·83	49 6·92	24 8·53	4·96	4 1·70	4 1·29	1 1·75	4·88	5·30	4·14	4·96	0·30	2 4·71	6·40	..	..	39 11·08	9 7·83	6 6 4·39

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXII.

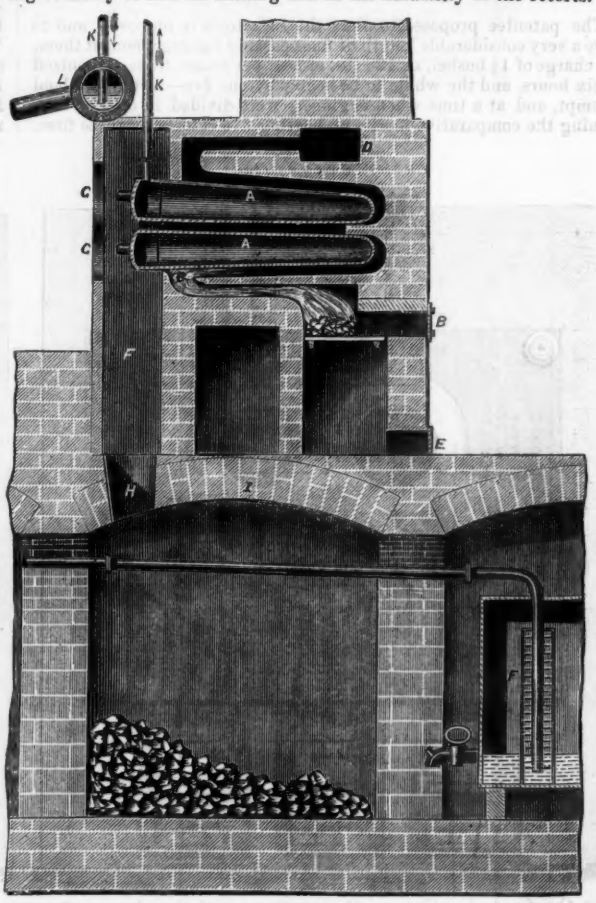


We now present to the reader a copy of an engraving which appeared in Accum's Treatise on Gas Lighting in 1820, bearing, as it does, on the subject under consideration. This, to use the author's words, "*Exhibits an economical arrangement of an apparatus for lighting a town or large district.*" "The central building exhibits the retort-house; the roof is furnished with a projecting louvre to let out the smoke. The gable ends and one of the sides are of brickwork, the other side is open, and supported by iron columns. The building to the right of the retort-house is the purifying-house, and contains the lime machine. The trap-door, marked *a*, indicates the cistern or receiver for the waste lime. Adjoining the purifying apparatus is the meter-house, the front wall of which is taken away to show the position of the gas-meter, the axis of which drives the agitating shaft of the lime machine, and for that purpose the axis of the meter and the shaft of the lime machine are connected by a strap as shown. The building to the right, at a distance, is the dwelling of the manager, and the small house to the left is a smith's shop. The retort-house contains three of Clegg's rotary retorts, B B B; each of the three columns projecting above the roof being surmounted by an hydraulic valve, the chains descending into retort-house, and passing over the pulleys at top of columns, being for the purpose of opening these valves, whenever desirable, for charging and drawing the retorts." The gasholder represented at the left, G, is Clegg's "collapsing holder," to which we shall have occasion to refer hereafter.

With all the complications and inconvenience attached to this system of retorts, it appears that they were used at several works for the supply of large towns such as Birmingham, Bristol, Chester, and other places, where, in some cases, the arms were of cast iron. But in due time the errors of the construction and process became evident, and they were abandoned.

At the period of the publication of the first three editions of Accum's Treatise on Gas Lighting, 1815 and 1816, little advancement seems to have been made in the subject under consideration, as we find the same and the only drawing of retorts in all those editions, a copy of which is annexed. The retorts are described as about 7 ft. long, 12 in. diameter in front, and 10 in. at back. Here we are introduced for the first time to the coke "hole," which afterwards becoming more extensive, received the name of "vault." The ash-pan is provided with a door, the only means adopted during many years for controlling the supply of air to furnace; and, according to Clegg's instructions to workmen, "the bridge or row of bricks of the flue, C, of the retorts should never be hotter than a bright red heat, which may be regulated by the door of the ash-pan." A wall, G G, will be observed, which was for the purpose of protecting the men from the heat, and to guide the coke into the "hole." The two circular openings, C C, were to enable the workmen to charge and discharge the retorts.

Following closely on the method of setting just described was the "flue plan," of which fig. 1, on the next page, is the front elevation, fig. 2 a transverse section, and fig. 3 a longitudinal section. The pipes shown passes from the condenser to the tar-well, seen in section F. This setting, it will be observed is somewhat similar to the last; but, instead of the heated air, or flame impinging on the retorts and passing direct to the flue, it is caused to travel through "flues" formed by the retorts, three times their length, in the direction of the arrows, before escaping the lateral flue. In this construction a very marked progressive step was made, both in obtaining economy of fuel for heating and in the durability of the retorts.



The success of this setting probably suggested to John Perks, of the Dorset Street Works, the application of the system on a

much more extended scale, for we find that in 1817 he patented "the means of arranging together a number of retorts made of iron or other metal, say twelve of them, in a circular form, with an additional one in the centre, by which means they become as it were one large vessel, divided by their sides into different compartments, and by separating the spaces contained within the circle of retorts by means of fire-bricks and Welsh lumps, and forming other spaces" (horizontal flues) "on the outside, I am enabled to convey the flame and heat from the fire-place in such directions, to and fro, among the retorts as will produce economical effects never before known or made use of."

FIG 1

FIG 2

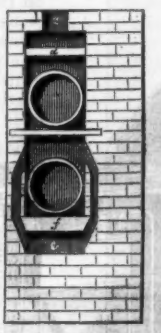
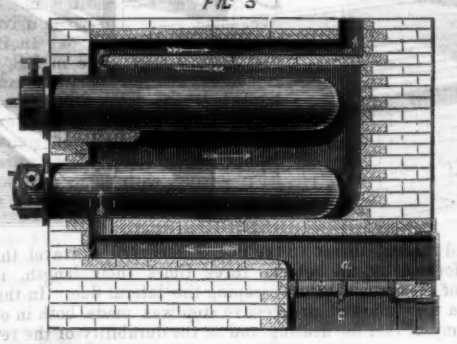


FIG 3



The patentee proposed to place the 13 retorts in one oven, and to have a very considerable length of flues passing zig-zag amongst them, the charge of 1½ bushel, or 126 lbs. of coal per retort, to be carbonized in six hours, and the whole to be heated by one fire—certainly a bold attempt, and at a time when engineers were divided in opinion concerning the comparative merits of heating five retorts by three fires, or two retorts with one fire. At first sight this mode of setting would appear to present some advantage, and in arranging it the patentee might have had in view the circuitous flues of the steam-boiler. But, in both instances, whether with the boiler or gas furnace, any excess of flue must be prejudicial, particularly in the latter, where, by its introduction, a large quantity of non-conducting material of necessity exists, and the passage of the heat is impeded; consequently the heat is absorbed at these parts in the immediate vicinity of the furnace, where the retorts attain the proper temperature; whilst those situated at a distance therefrom are at a degree of heat quite unsuitable for carbonization. This evil exists, in some settings of retorts, even at the present day, and wherever there is a superabundance of flues, as the term is, "wire-drawing" the heat, the proper temperature and strict economy of fuel can never be obtained. Beyond a fair trial, and some experience, nothing more was achieved by Perks's settings.

Our subject, at the period in question, began to be retrogressive, for although the "flue plan," with two or more retorts, was acknowledged to be a success, yet the fire-bricks used for flue and shield of the retorts were regarded as impediments to the passage of the heat, forgetful, as it appears, of the purpose they served. Rackhouse proposed to avoid this by submitting the retorts to the direct action of the fire, so going back to the earliest of Murdoch's experiments; and this arrangement was denominated the "oven plan." The account of this given by Peckstone, when writing two years afterwards, is by no means flattering.

He says, "By adopting the oven plan we shall hardly find there are any advantages gained; but contrariwise, the retorts, instead of lasting longer, were two-thirds of them burnt out in less than two months, owing to the lower ones being placed immediately over the fire, from the action of which nothing was left to guard them. Their form precluded every hope of carbonization being accomplished in less time than by others of a cylindrical shape; and as to the per centage at which carbonization was being carried on, what could be expected, when, after the retorts had been in action about six weeks, it was necessary to keep up twelve fires to enable the stokers to work as many retorts?"

"Various have been the alterations made by different workmen in the fire work to the retorts since the oven plan was adopted, but hitherto most have failed in remedying the very serious evils which must arise from their rapid destruction. Heretofore, a retort of the same shape and dimensions, when constantly used night and day, according to the flue plan, lasted from eight to ten months, but on the oven plan the retort seldom remains in a working state more than as many weeks."

Prior to the operations of Rackhouse, John Malam, who had succeeded Clegg as engineer of the Chartered Company at the Peter Street station, submitted to the directors of the company a plan of setting five retorts in an oven to be heated by three fires. We have been favoured by Mr. W. Mann, the engineer of the City of London Works, with drawings of such a setting, bearing Malam's signature, of the date 1817, copies of which are here given, figs. 4, 5, and 6. It is identical with the description given by Peckstone, and it is highly probable that the drawings were those in question, submitted to the directors of the Chartered Company.

FIG. 4.
FRONT ELEVATION

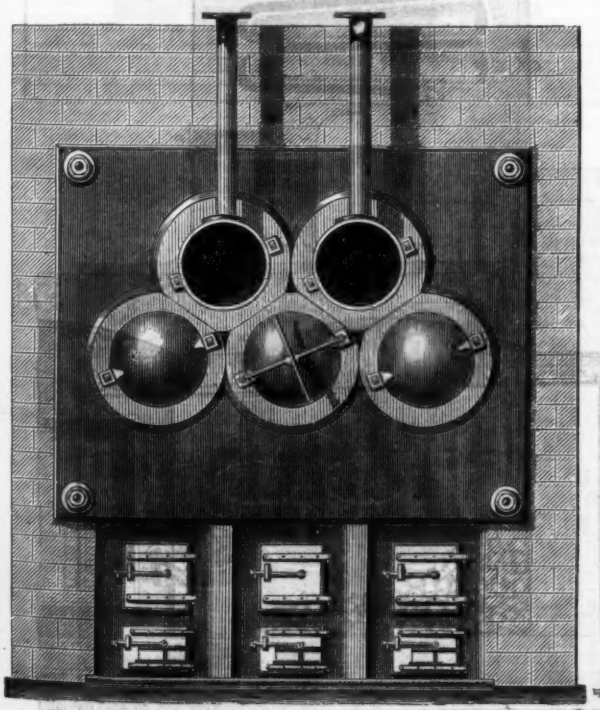
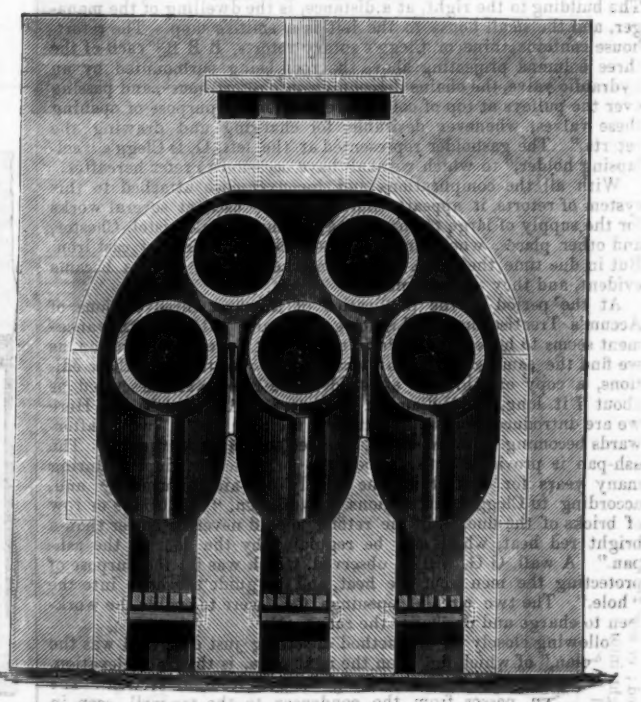


FIG. 5.
TRANSVERSE SECTION.

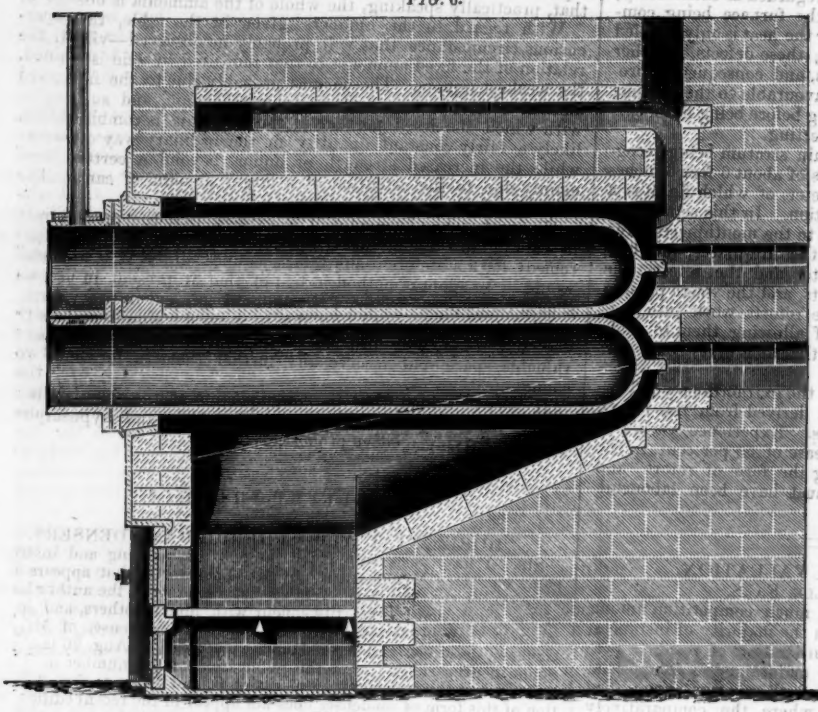


In the front elevation we observe the cross-bar and screw-flyer introduced; there is also a cast-iron frame bolted on to the front wall of the bench of retorts, and a small vertical opening in the door of the ash-pans, to admit air to the furnaces. Subsequently these openings were increased to three, as shown in the drawings by Peckstone, but up to this time the inconvenience of the accumulation

of carburet of iron on the exterior of the retorts does not appear to have been understood, as there were no means of removing it. The first ascension-pipes were 2 inches in diameter; but, on account of their being continually stopped, some time afterwards, when Malam introduced the elliptical retort, they were increased to 3 inches diameter, and no alteration was made in them (at least at the metropolitan works) until about 1842, when they were altered to 4 inches; at the present time they are generally 5 or 6 inches in diameter.

By the transverse section it appears that Malam proposed to support his retorts on cast-iron crutches, but these were subsequently discontinued, as hereafter shown. The retorts are represented as being kept at a great distance from the fire, undoubtedly with a view to their conservation and to the equalization of the heat. The immense fire-places (three in number) would suggest an enormous expenditure of fuel for heating; but, according to Peckstone, this was not the case, as they were heated with about 30 per cent., whilst those on the flue plan required from 20 to 35 per cent., according to the number of retorts, the most economical being the settings of two in a bed as described. The fuel used in all cases was coal.

FIG. 6.



The accompanying figure represents a longitudinal section of the setting, the retorts in this instance having lugs on their ends, which rest on the brickwork; but, being unprovided with intermediate supports, they would certainly have a tendency to bend in the centre when heated, and as the greater portion of the heat had to pass by the ends of the retorts, we should imagine they would have been speedily burned out at that part. However, their average duration appears to have been about nine months, the "heat being a good red, as seen by daylight." At the back of the flanges of each retort is a collar, conical on its exterior, and fitting into a recess in the cast-iron plate, which was intended to facilitate the removal of a retort when burned out, and to place another in its stead. How far this was successful is not stated. We, some years ago, when driven to a great emergency, took out an iron retort from a bed while in full action, replacing another in its stead; and badly were we recompensed, for, within an hour afterwards, it flew into a dozen pieces, and, of course, our labour and the retort were lost. This setting, with some modifications, was very generally adopted for several years.

The years 1817 and 1818 were remarkable for attempted improvements in retort-settings, and we now pre-

FIG. 7.

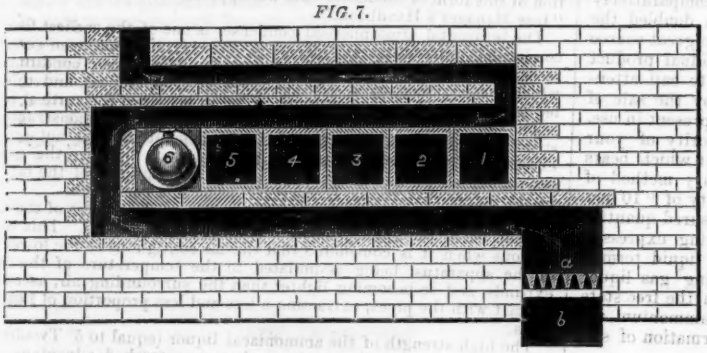


FIG. 8

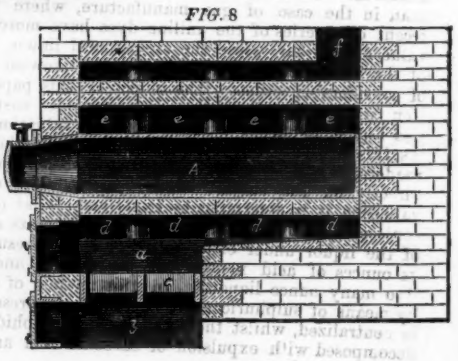


FIG. 9.

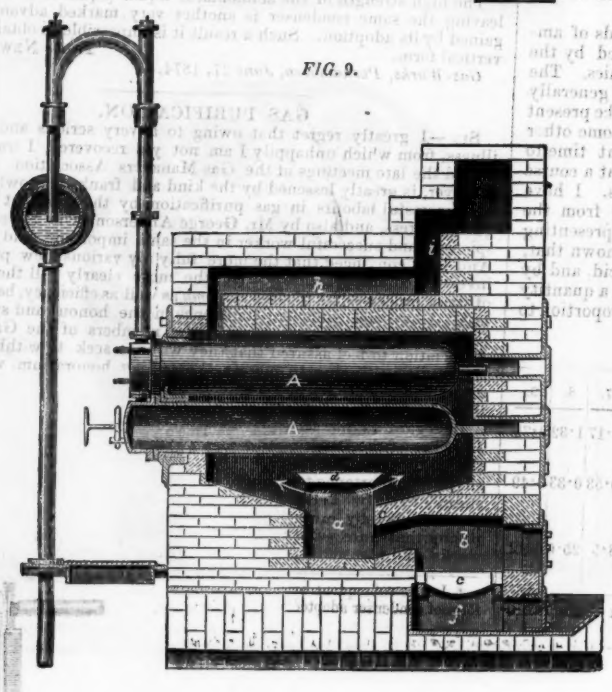
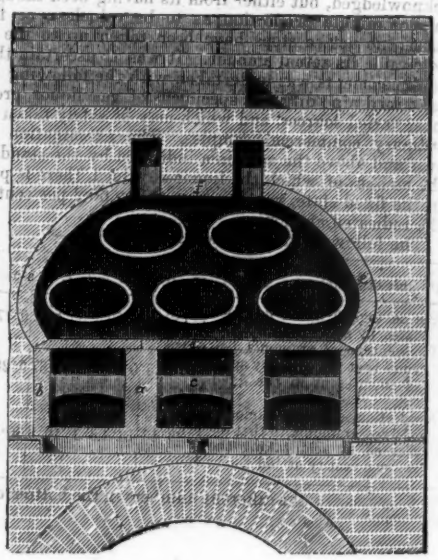


FIG. 10.



sent an invention of that period, of which fig. 7 is a cross section and fig. 8 is a longitudinal section.

These retorts were set six in one bed, placed close alongside one another, as seen, numbered from 1 to 6 inclusively, protected at the lower part by fire-bricks, and heated by one fire, the door of the furnace being in front. The fire-place being at one end, it was so contrived that the flue passed under the whole range, then passing over the top as shown by the arrows. This mode of setting had the disadvantage of requiring about three weeks continuous firing before it was fit for carbonization, otherwise Peckstone spoke favourably of its working, and reproduced drawings thereof so recently as his edition of 1841. Judging simply from the drawing, it is difficult to imagine how such a setting could have been regarded as satisfactory, possessing, as it does, the disadvantage of the furnace being comparatively isolated from the retorts. Further the heat is only enabled to act on two of the four sides of each retort; these defects, together with the large area occupied by the settings, and consequently proportionate radiation of heat, are all facts unfavourable to the system; moreover, the length of time required for firing before being fit for carbonizing tells forcibly against this mode of setting.

The importance of distilling coal in a thin stratum being recognized, led Malam to employ elliptical retorts of about 6 feet 6 inches in length, and 20 inches by 10 inches diameter, of which fig. 9 is a longitudinal section, and fig. 10 a cross section. In this setting the furnace is at the opposite side of the bench to the mouthpieces, arch lumps, *c c c*, are placed immediately over the fire-places, and fire-slabs, *d d*, are interposed between the latter and the retorts, the heat ascending and surrounding the retorts, and the waste passing off to flue, *h*. The lugs at the ends of the retorts work into cast-iron pipes, probably with the intention of allowing them to glide freely as the retort expanded by the heat; the same pipes seem also to have served the purpose of sight-holes.

Peckstone attributed to this system all the extraordinary advantages of large production of gas and coke derived from the rotary retort, with none of its accompanying evils. Experience teaches us that it is simply absurd to expect an increase of 50 per cent. in the yield of gas and coke, by merely changing the form of retort; and the author, in making such statement, must have been labouring under a delusion.

(To be continued.)

ON GAS LIQUOR AND ITS VALUATION.

By H. Leicester Greville, F.C.S.

At the present time, when there is so much competition among our manufacturing industries, it is only, in the majority of instances, by a strict attention to the economical utilization of residual products that many large manufactures are maintained as commercial successes. In no instance is the truth of this better exemplified than in the case of gas manufacture, where the comparatively recent discoveries of the aniline dyes have more than doubled the value of coal tar, while the ammoniacal liquor, as the great source of the ammonia salts of commerce, is likewise a residual product of considerable value. The object of this paper is to call attention to the loss which the gas companies sustain by the sale of gas liquor, as tested by the method of valuation at present in use. As this method is doubtless well known to the majority of your readers, I will only briefly refer to that portion of it which bears directly on the subject of my paper. The ordinary method of valuation is to determine by experiment what quantity of "10 per cent. sulphuric acid" is required to neutralize a measured quantity of the liquor under examination, the final result being expressed as ounces of acid neutralized per gallon, and the liquid termed "so many ounce liquor." In this method of valuing gas liquor by means of sulphuric acid, any ammonia present in the free state is neutralized, whilst the carbonate and sulphide of ammonium are decomposed with expulsion of carbonic acid and formation of sulphuretted hydrogen.

There are, however, present in the gas liquor, compounds of ammonia which are not affected, and therefore not indicated by the acid, and which are thus altogether lost to the gas companies. The existence of ammonia in these forms appears to have been generally acknowledged, but either from its having been thought to be present in such minute proportion as to be valueless, or from some other cause, no active steps have been taken up to the present time to determine its actual amount. It was to ascertain this that a course of experiments was undertaken with the following results. I have examined nine different specimens of gas liquor procured from the most varied sources, and which may be safely taken as representing ordinary commercial samples. The examination has shown that, over and above the ammonia indicated by the standard acid, and by the amount of which the liquor is valued, there is present a quantity in the fixed state, varying from 8·4 to 66·2 per cent. in proportion to the indicated ammonia.

The following table shows these results:—

Number of Sample.	1.	2.	3.	4.	5.	6.	7.	8.	9.
Per centage of ammonia indicated by acid	1·245	3·50	5·65	3·42	0·77	4·88	6·17	1·32	0·74
Per centage of ammonia beyond that indicated by acid, *id est*, present in the fixed state	0·275	0·47	0·47	0·37	0·28	0·70	0·53	0·33	0·49
Proportion between the amount of fixed ammonia to that indicated by acid, taking the latter quantity at 100 . .	20·4	13·4	8·3	10·8	36·3	14·3	8·5	25·0	66·2

The mean of the different numbers in the bottom column of the table exhibits the actual loss which the gas companies are experiencing, and the average of these numbers is 22·56, or over 20 per cent.—a considerable amount. Taking the value of 10-oz. liquor as one penny per gallon, a very low estimate, and assuming that 20 gallons are obtained from a ton of coal, a result easily procurable by the most improved form of the "Mann Scrubber," the money value of liquor to a large company such as the Chartered, using, say, 1000 tons of coal a day, would be something like £30,000, and 20 per cent. on this amounts to £6000—a somewhat considerable sum. This calculation has, of course, no pretensions to absolute accuracy, and is given only as approximatively correct. It must likewise be borne in mind that what is the company's loss is the buyer's profit, as the process to which the liquor is submitted in the manufacture of the ammoniacal salts is such that, practically speaking, the whole of the ammonia is obtained.

With regard to the numbers given in the table, there is one curious circumstance that will probably be observed—viz., that the relation of the fixed ammonia to that indicated by acid is greatest in the weakest liquors. This is most probably due to the fact that the amount of the various acids (sulphuric, cyanic, and sulphocyanic) with which the fixed portion of the ammonia is combined, is very likely a fairly constant quantity in the ordinary way of working, while the increased strength of liquor, beyond a certain limit, is mainly due to the retention of a larger amount of carbonate and sulphide of ammonium.

From what has been said, it is evident that the present method of valuing gas liquor does not give its true value, and the best remedy for a state of circumstances as uncertain as it is undesirable, would be to adopt a method in lieu of that at present in use, which should indicate the whole of the ammonia present in every form.

I have some hopes of being able to suggest a simple process if the necessity arises, but must not at present trespass further on your valuable space, but reserve any further remarks for some future communication.

It may be added, that the fixed portion of the ammonia is combined with sulphuric, cyanic, sulphocyanic, and hyposulphurous acids, in varying relative proportions.

Correspondence.

HORIZONTAL ATMOSPHERICAL CONDENSERS.

Sir,—I have read with much interest the amusing and instructive paper on "Gas Manufacture," by Mr. Longworth, that appears in the Journal of the 2nd inst. Whilst disagreeing with the author in some of his conclusions, I heartily concur with him in others, and in none more so than in his remarks on the flat screw condenser of Mr. D. A. Graham, described and figured in the Journal of Aug. 26 last year.* Some months elapsed after the publication of the number in question before I had the opportunity of perusing it, and owing to this, a description of this form of condenser does not appear in the recent edition of the "Gas Manager's Handbook."

The horizontal atmospherical condenser is one of the earliest forms of condensing apparatus. Its efficiency, however, has not been generally recognized for want of a correct knowledge of the true conditions on which the condensation of coal gas ought to be conducted, and this has led to its having been generally discarded in favour of the vertical form.

The horizontal flat screw condenser of Mr. Graham is constructed on strictly scientific principles. In his arrangement there is not only an extension of the system of prolonging the contact between the gas and the condensed products, but there is also a recognition of the fact that *length*, rather than *height*, is the *desideratum* in a condenser.

In the ordinary high vertical condenser the cooling effect of the air on the surface of the upper portion of the pipes is almost *nil*. This will be obvious when it is considered that the air contiguous to the lower part of the apparatus, being assimilated to the temperature of the latter, expands, and so becoming lighter than the surrounding air, ascends in contact with the pipes, extracting a less and less proportion of heat as it rises.

The high strength of the ammoniacal liquor (equal to 5° Twaddel) on leaving the same condenser is another very marked advantage to be gained by its adoption. Such a result it is impossible to obtain from the vertical form.

Thos. Newbigging.

Gas-Works, Pernambuco, June 27, 1874.

GAS PURIFICATION.

Sir,—I greatly regret that owing to a very serious and protracted illness, from which unhappily I am not yet recovered, I was unable to attend the late meetings of the Gas Managers Association. My regret, however, is greatly lessened by the kind and frank acknowledgment of my successful labours in gas purification by the president in his inaugural address, and also by Mr. George Anderson, who himself is a conspicuous and successful worker in the same important field of inquiry. And I am convinced that the more fully my various new processes are investigated and practically tried, the more clearly will the importance of these processes, as regards *economy* as well as efficiency, be made manifest. I have also sufficient confidence in the honour and spirit of good feeling and fair play on the part of the members of the Gas Managers Association to feel assured that they will not seek to withhold from me the credit justly due to me, or the trifling honorarium, which is all I desire and claim, for my long labours, and for the advantages which those labours have conferred upon the gas companies.

In regard to the letter of Mr. Newbigging, which appeared in your Journal of the 7th inst., I have little to say; for he acknowledges, in the just spirit of an unprejudiced inquirer, all the points that are of the slightest importance to me. He allows—or rather frankly and explicitly states—that Dr. Letheby did not in any way describe or indicate any process whereby sulphide of calcium was to be produced; or even supposing that pure sulphides of calcium had been brought into the gas-works, and placed in purifiers, how this material could be employed in

* In the subsequent number of the Journal, Mr. Livesey described a similar form of condenser adopted by him.

an efficient and reliable manner for sulphur purification. In fact, soda-waste, which contains a large portion of sulphide of calcium, had been tried at the Bow Common works, the result, according to Mr. Harris himself, being a complete failure. Indeed, until the important *rôle* which carbonic acid plays in the working of lime purifiers—which every one admits I was the first to point out and practically apply—was known and attended to, sulphide of calcium, in whatever quantity employed, was quite useless as a purifying material; for unless the gas was decarbonated before entering the sulphide of calcium vessels, the most probable result would be that there would be more sulphur in the gas on leaving these vessels than before, seeing that the CO_2 would drive off an equivalent portion of the SH_2 contained in the sulphide of calcium as well as any CS_2 which it might have previously absorbed.

In my first letter I said: "It is needless to observe that there is here [in Dr. Letheby's lecture] no process for producing sulphide of calcium as I have done, nor for decarbonating the gas before it enters the sulphide of calcium." Mr. Newbigging acknowledges this entirely. He remarks, "Who said there was? Not the present writer certainly." His only objection is that he takes a different view of the object or general tendency of Dr. Letheby's remarks. Possibly, in the sentence in which I refer to this, I may have judged too much by the *actual recommendations* made by Dr. Letheby, while Mr. Newbigging gives more weight to the idea which Dr. Letheby had in his mind, but with which the practical recommendations which he makes do not tally at all. The learned doctor's recommendation was that the lime should be kept in the purifiers "until the sulphuretted hydrogen of the foul lime is largely displaced by the carbonic acid of the raw gas." Whereupon I pointed out that this was wholly wrong, inasmuch as that from the very first moment that sulphuretted hydrogen begins to be driven off, no sulphur at all is absorbed by the lime; on the contrary, the sulphur in all forms previously absorbed is given back into the gas, and the lime gradually converted into the inert form of carbonate.

R. H. Patterson.

11, *Wellington Terrace, Hammersmith, July* 15, 1874.

Sir,—Although I had the pleasure of hearing Mr. Anderson read his paper upon purification, I have been waiting until I had your report in my hands to make a few remarks upon it, and to try to elicit some explanation from him which may clear up the fog in which it has enveloped me.

As far as I understood at the time, or, after a careful perusal of his paper, can now see, Mr. Anderson's process consists in removing the whole, or nearly the whole, of the SH_2 in the gas as it leaves the condenser by means of an arrangement of washers and scrubbers. The analysis of the foul lime taken from the purifiers at Dover, and which I presume to be an average sample, confirms me in this view; for, as sulphur is found in the lime to so small an extent, but very little can have entered the purifier, and, as you observe, the mystery is how a "foul" test is ever obtained; foul, that is, so far as SH_2 is concerned.

And this is really the mystery, for Mr. Anderson states that the purifiers are foul, but that, when a foul test is obtained, instead of removing the lime, he continues to pass gas until it is desulphuretted by CO_2, when it is removed as carbonate of lime, the SH_2 passing on to the next box to be treated in the same way, and so on in perpetuity. It is of course well known that this can be done in the first instance, but Mr. A. seems to overlook the fact that as his gas contains SH_2, the proportion of CaS must be ever increasing, until a box must ultimately be removed all CaS; or that a great waste of lime is committed, if such a quantity be used that it is only foul on an average to the extent his analysis shows.

But three solutions appear to be possible:

1. That Mr. Anderson has discovered the action of some occult force, converting his sulphur into some other element; or

2. That the SH_2 is driven forward for some time (the gas, as it leaves the scrubber, containing but little), and is ultimately removed as CaS from a foul box; or,

3. That no SH_2, or but the almost inappreciable amount the analysis shows, passes the scrubber.

The first idea is manifestly absurd; the second is denied; so the third only remains.

But, if it is a fact that all the sulphur is removed by the washers, what are the large purifiers for? and (as the CO_2 and any trace of SH_2 could be easily removed by a wet lime purifier) has not the long-desired object of purification in closed vessels by a continuous process been at last achieved by Mr. Anderson?

Nor does Mr. Anderson touch upon the real sulphur difficulty—the removal of CS_2 and other sulphur compounds other than SH_2—for he reverses the referees process, removes all his SH_2 before it reaches the lime, and leaves nearly all the CO_2 to convert his lime into inert carbonate, having no action upon these "nuisances."

If SH_2 were the only form of sulphur with which we had to deal, little could be desired as improvement upon "oxide" purification, which is as cheap as it is effective. In my own case, as I am under no obligation to remove sulphur other than SH_2, I use oxide exclusively, and find that labour (although my purifiers are much too small) has averaged, for the last six months, only ·32d. per 1000. I am now putting down four purifiers, each 20 feet square, to a maximum anticipated make of 750,000 per diem, and shall be disappointed if labour then exceeds ·25d. per 1000. Material now costs nothing, not even carriage.

I hope Mr. Anderson will, as far as he is able, lighten my darkness; and I would suggest to him that an analysis showing the quantity of sulphur in the gas—1, at inlet to washer; 2, at inlet to purifier; 3, at outlet to purifier—would go far to clear up the subject.

As few engineers have devoted more attention to the sulphur question, I am convinced that, although I, as well as many others, cannot see the *rationale* of Mr. Anderson's process, whatever proceeds from him is sure to be eminently sound and practical.

July 10, 1874. Hope.

THE AUTOMATIC SEWAGE-METER.

Sir,—Messrs. Denton and Field, in their letter on the above subject, in your issue of the 7th instant, state that the apparatus invented and patented by me 11 years ago, "so far as it is described in his specification, is not automatic." As the service bore which, with the self-acting syphon, constituted the invention in my patent is identical in principle with their sewage-meter, it is immaterial to me whether it be called automatic or otherwise. It is sufficient to state that the vessel, of its own action, empties itself when full, as their meter does, by means of a vertical syphon, and with a continuous, but restricted, inflow, such as the modified object of their apparatus involves, it fills and empties itself periodically, discharging a measured quantity of liquid on each occasion in a manner precisely similar to that claimed for their sewage-meter. In fact, I recognized my invention—the meter self-acting syphon—the moment I saw their diagram.

T. Mellard Reade.

Canning Chambers, Liverpool, July 11, 1874.

TARRY MATTER IN GAS.

Sir,—Allow me to thank Mr. Methven, Mr. Robb, and others for the kindly feeling shown in replying to my note. If there was more of this friendly spirit prevailing, and less personal jealousy, perhaps we would sooner arrive at correct data in matters that still seem strangely undefined. The variety of material employed in the manufacture has, no doubt, caused a certain confusion of ideas; but, after the lapse of, say, half a century, the broad principles involved in the process ought to be better understood and acknowledged. The good or bad management of a gas-work is not a personal matter, for the needless waste of one ton of coal is a loss to the world at large, and yet science has left the searcher after truth in the disagreeable dilemma, should he attempt to follow the different theories propounded, that the works under his charge would require to be remodelled every few years—a difficult undertaking in any case, but more so where directors imagine their works to have been brought to a state of perfection long ago. Having experienced the benefit of a simpler form of scrubber (or condenser, for the terms appear confused) than that mentioned by Mr. Robb, I can fully believe in the efficiency of the one he suggests; but, without entering further meantime into the wide field of condensation, where the gradual process is met by the other extreme of Pélouze and Audouin, and where the advocates of scrubbing and washing are equally divided on the best means of accomplishing the end in view, I should like to hear, from some of your able correspondents, a definition of the laws regulating the height and dimensions of chimneys and the heating of furnaces, considered in relation to the coal to be carbonized and the fuel at command.

R. R.

THE SILBER BAT'S-WING.

Sir,—Among a host of new inventions exhibited at the London Tavern, on Saturday last, by Mr. Silber, for giving us more light than we have got, for the same money, was an improved bat's-wing burner, having a central pear-shaped body, with a small burner at the bottom and a large one at the top. Dr. Valentin innocently tells us "that by these simplest of means the amount of gas issuing from the top burner can at no time be greater than the bottom one allows." There will be no difficulty in seeing this, but very great difficulty in seeing anything at all new about the burner. I can produce not less than a score so-called inventions of burners identical in construction with the one described above. This kind of thing is almost as old as gas lighting itself, and the burner in question is no more an improvement on those gone before than to-day's sun is over that of yesterday. The Silber Light Company can scarcely be congratulated on the shrewdness of their leader in claiming this as one of his inventions.

The photometric results given are sufficiently indefinite to do for any burner, but from these we are told to "consider the new burner a considerable improvement upon burners of a similar kind hitherto constructed."

Mr. Silber, or the "Silber Light Company," have such a wonderful power over the leading organs of the press, that contrivances of theirs can be flourished into the world in such a style as to leave the uninitiated scarcely room to doubt their value.

There is, however, a large section who know well this reproduction, and who will not only doubt the value of inventions brought out in this way, but who will also doubt the propriety of the process.

Leeds, July 18, 1874. Geo. Bray.

IMPROVEMENT IN GAS-METERS.

Sir,—To every observant person practically acquainted with gas-meters it is known that the UPPER portion of bearings of wet meters are sometimes very considerably worn, as was noticed by Mr. Warner in his first paper on meters. We beg to draw the attention of your readers to this, that they may note the variation of "water-line" is not the only cause of ALTERED capacity of wheel; hence a fixed "water-line" does not ensure perfect accuracy. Permit us to add that neither change of "water-line" nor wear of bearings will in the least affect the wet meter recently patented by Messrs. Warner and Cowan.

These remarks were suggested upon reading your Paris correspondent's notes on the formation of the French association.

Edinburgh, July 16. William and Benjamin Cowan.

SILBER BURNERS AND GIROUD'S RHEOMETER.

Sir,—I am very glad to find—from a notice in your last issue, as well as from a much longer one in *The Times* and other journals—that the Silber burner, having been duly christened at the London Tavern on Saturday last, has now emerged from the mysterious, and come out into the open. I have not had the pleasure of seeing one yet, because they are not at present on sale, and thus those improvements, which are said to produce such excellent results, are still invisible to me. Although my object in writing to you this week has not much to do with the Silber burner, I take this opportunity of telling Mr. Silber that I have not (as I understand he has more than once intimated) made use of unworthy means to obtain a sight of one of his inventions. The only thing I have seen is the specification of his patent. This, curiously enough, says nothing about allowing the gas to issue at a minimum of pressure, which I now read he says is one of the principles to be kept in view in order to obtain the maximum amount of light from gas. I was, indeed, not before aware that Mr. Silber entertained any views in that direction.

Now, the principal object of this letter is to draw the attention of your Paris correspondent to some errors he appears to have fallen into with respect to the difference between Mr. Giroud's rheometer and Sugg's "dry regulator of pressure," or lamp-governor, as I call it. More than 400,000 of these governors are in use in various parts of the world, and have given, and are still giving, very satisfactory results. The apparatus

of Giroud is, in comparison with the Sugg's regulator, untried. The trial spoken of as made in Paris is on a very small scale, and under conditions (quite different to those in a great many other places) eminently favourable to such a system as Mr. Giroud's. I have both seen and tried the Giroud rheometer with English gas and foreign, and I merely say that, to form a correct opinion of its practical working, it should be tried in sufficiently large quantities, under variable circumstances, before supremacy is claimed for it over mine. The Sugg governor has been on trial a great many years; Mr. Giroud's and several others are on their trial; public opinion will decide between them. At the same time, I have no wish to discourage criticism upon any of my inventions—quite the contrary; I only wish that these criticisms should be fair, and I am quite sure your Paris correspondent will be disposed to give me credit for speaking my true mind when I say so.

Without further preface, I will now ask him to examine more closely any of my regulators, also one he will find at Mr. Brunt's factory in Paris, which is patented in France. He will then see that the leather gasholder in my governors acts in a precisely similar manner to the gasholder in Mr. Giroud's rheometer. There is no tension at all; if there were, the governor would cease to act, exactly in the same manner as the Giroud's rheometer would cease to act if there were anything to impede the lifting or falling of the bell.

In the paragraph following he says, speaking of the difference between the two governors: "The Giroud's rheometer delivers a constant volume of gas under all pressures, whilst the dry regulator gives a sensibly constant pressure at the jet." This phrase is not to my mind very clear, but I think I understand what the writer wishes to convey—viz., that in the Giroud's rheometer the quantity delivered is regulated by a hole or fixed aperture in the crown of the gasholder, while in the Sugg's regulator it is regulated by the size of the burner, the dry gasholder of the latter only being of use to maintain a constant pressure. In reply to this, I say that it is not always the case with Sugg's lamp governors, that the quantity to be consumed is regulated by the burner, although in a great many cases it is so. I always consider the governor and the burner as parts of one instrument; and if the burner should be broken in any way, I recommend, in my instructions to those who make use of my governors, that the governor should be removed and retested after having been provided with a new steatite burner. I have never used iron burners with my governors, because I very early found that they were not to be depended upon to maintain a constant rate of consumption. In parenthesis, I may remark that, knowing that till lately only iron burners were used in Paris, I am surprised at the success which has attended the Giroud's rheometer. Probably this is owing to the very wide slit in the Paris lamp burners, which is nearly one-quarter of a tenth of an English inch.

In all cases the Sugg's lamp-governor is provided with a burner of a certain size, best suited to the quality of gas it is intended to consume. It is regulated by putting on to the top of the holder a weight sufficient to raise the pressure, at the point of ignition, to such a height as to cause the issue of the quantity of gas required. But it can be, and is, done (in the manner described in two of my patents), by means of a moveable cone or adjusting screw, placed sometimes on the holder of the governor, and at others inside the cone into which the burner is fixed. This is what I call double regulation. Using a Paris burner, I can regulate the issue of the gas at the top of the gasholder (by means of the regulating screw) to 140 litres per hour, or nearly 5 cubic feet (English), issuing under a pressure a little over one-tenth of an inch. This quantity of gas will freely pass out at the point of ignition of such a burner, which only requires one-tenth of an inch pressure to do its work. If I were to make governors on this system for English gas, usually requiring from four to six tenths of an inch at the point of ignition to prevent smoking the lanterns, I should have to regulate the issue from the orifice on the top of the gasholder to the required quantity, say, 5 cubic feet, the gasholder being weighted to four or six tenths pressure as the case may be. I have not adopted this latter mode of regulation for my English lamp-governors, because I am not satisfied myself that it is better than the other; but for French gas, burning under very low pressures at the point of ignition, it will work very well. Nevertheless, a lamp-governor regulated either upon my first or second system, or that of Mr. Giroud, cannot maintain the same consumption if the burner to which they have been regulated is changed for a larger or a smaller one. I quite agree that when the issue of the gas is properly regulated by an orifice on the top of the gasholder of the governor, either Sugg's or Giroud's, the substitution of a much larger burner for the proper one may not seriously affect the quantity of gas consumed; nevertheless, if the governors are working under the average meter system, I should not care to do even that for fear of raising a dispute.

If, then, a fresh regulation is required for every alteration of the burner, there can be no advantage gained by Giroud's system over Sugg's. It is only two different ways of arriving at the same result.

Your correspondent also says that the holder of the rheometer being made of metal offers more security than the dry regulator. To this I say, that with such leather as I use for my lamp and other governors, there does not appear to be more liability to leakage than there is with a metal bell partly immersed in glycerine. One must set the possibility of a hole in the leather against that of a leak in the metal, or the upsetting or loss in any way of the glycerine. The every-day wear of London and provincial lamps is a little rougher than that of the nicely made and well cared-for lamps in the principal streets of Paris, where the Giroud's rheometer is on trial.

With regard to the effect of ammonia on the leather—certainly, after a time, a strong dose of ammonia does take away the oil which is on the leather, and, unless the gas is rich enough to counteract the effect of the ammonia by supplying more oil to it, will finally harden it, and make it lose its delicacy of action—a little sperm oil applied with a brush will restore it. Happily in England, and most other parts now, ammonia is fast disappearing from the gas delivered to the public, and getting into the pockets of the proprietors of gas-works in the shape of profit.

Up to the present it has not had any remarkable effect upon the generality of governors in use, but in a very few isolated cases it has necessitated a slight repair to the governor, and a readjustment. I presume, however, that its effect would be as much felt upon a Giroud rheometer as upon a Sugg dry regulator. Your correspondent further says that different makers of Sugg's regulators have remedied some of the defects of his arrangements. It is true that, being so successful, my first lamp-governors have been copied exactly, but not improved upon. As for the second, which is a patent lamp-governor, it has not, that I am aware of, been copied at all. My correspondents, August Faas and Co., of Frankfort, are at present the only manufacturers of it on the Continent. The well-known firm of Brunt and Co., of Paris, have signified their intention to work my French patent for lamp-governors, so that these are soon likely to be tried in France upon a practical scale.

Permit me also to say to Dr. Wallace, whose remarks upon my small governor-burner and lamp-regulators in general appear on page 586 of your JOURNAL of the 28th of April last, that since that date I have sold a great many such burners to Glasgow, and that the consumers are very well pleased with them. The governor he tried was out of order, or it would have given better results. Generally, these governors are not made to come into action till there is 8-10ths pressure on the inlet; his test at 5-10ths was, therefore, no test at all.

I trust also he will pardon me for saying that, comparing the drawing shown of Peebles's lamp-governor, and his explanation of its action with others, it is hard to see why a change in the outward form of a governor should make them work better than those before made.

July 18, 1874. WILLIAM SUGG.

Parliamentary Intelligence.

HOUSE OF LORDS.

TUESDAY, JULY 14, 1874.

The Ystrad Gas and Water Bill was returned from the Commons agreed to.

The Dublin Corporation Water Bill was returned from the Commons with the amendments agreed to.

THURSDAY, JULY 16.

The following Bills received the Royal Assent by commission—viz., Gas and Water Orders Confirmation, Neath Corporation, Horbury Local Board, Shipley Local Board of Health, Middlesborough Extension and Improvement, Belfast Water, Skipton Local Board of Health, Wigan Improvement, Belfast Corporation Gas, Alliance and Dublin Consumers Gas, Nottingham Corporation Gas, Nottingham Water, Dublin Corporation Water, Ystrad Gas and Water.

The Cupar Water and Dundee Water Bills were read the third time, with the amendments, and passed.

The Ulverston Local Board Bill was returned from the Commons with the amendment agreed to.

The Sanitary Laws Amendment Bill was read a first time.

FRIDAY, JULY 17.

The Edinburgh and District Water Bill was returned from the Commons with the amendments agreed to.

HOUSE OF COMMONS.

MONDAY, JULY 13, 1874.

The Lords amendments to the Dublin Corporation Water Bill were agreed to.

The Ystrad Gas and Water Bill (Lords) was read the third time, and passed.

TUESDAY, JULY 14.

SANITARY LAWS AMENDMENT BILL.

On the report of amendments in this Bill,

Mr. MORGAN LLOYD moved to insert in clause 38 (which gives power to purchase any water-mill, dam, or weir which interferes with the proper drainage of, or the supply of water to, its district) the following words:—"And may, for the purpose of supplying its district with water for drinking and domestic purposes, purchase, either within or without its district, any land covered with water, or any water, or right to take or convey water." He said he hoped the President of the Local Government Board would see his way to adopt this amendment. Its object was a very simple and a very necessary one. It was to enable sanitary boards in rural districts, without expense, to obtain water for villages or small numbers of houses where the locality could not afford the expense of either a Provisional Order or of an application to Parliament for an Act authorizing them to obtain water. He could not see what objection there could be to giving this power to the local sanitary authority, because it was a power that could not be exercised except under the authority of the Local Government Board, who would be a check upon the local sanitary authority. The only objection, when he brought the clause before the committee, was, that it would enable the local sanitary authority to compete in some instances with companies who had power to supply towns with water. In those cases this power would not be required, and would not be exercised; and if any company had any ground to object to the exercise of this power by a local authority, all they would have to do would be to state their case to the Local Government Board, who, he had no doubt, would do justice between them and the sanitary authority. But in fact the clause was only required for those localities that could not afford the expense of a Provisional Order or an Act of Parliament.

Mr. SCLATER-BOOTH said he was very unwilling, in the position of water supply at this moment, to do anything that might cause a hindrance to the supply of water in any locality. He believed there were provisions in the old law which would be sufficient for the purposes the honourable and learned gentleman had in view; but if he was of opinion that the insertion of these words would make it clear, on the face of the bill, that local authorities might obtain a supply of water in the locality if that were required, he did not think that any conflict would arise with the water companies, and on the whole he was inclined to agree to the insertion of these words.

Mr. WHITWELL remarked that power was given to magistrates to close pumps and wells which were in a state dangerous to health, and the power given by this clause to obtain water elsewhere would be very acceptable.

Mr. WHALLEY begged to thank the right honourable gentleman for his attention to this matter.

The motion was then agreed to, the words were inserted accordingly, and the Bill ordered to be read the third time on Thursday, July 16.

WEDNESDAY, JULY 15.

The Lords amendments to the Ulverston Local Board Bill were agreed to.

A petition of the Local Board of West Derby for alteration in the Sanitary Laws Amendment Bill was presented.

THURSDAY, JULY 16.

The Lords amendments to the Edinburgh and District Water Bill were agreed to.

The Sanitary Laws Amendment Bill was read the third time, and passed.

THE SUPPLY AND STOREAGE OF WATER.

Mr. WHALLEY asked the President of the Local Government Board whether, while awaiting further legislation in respect of sanitary improvement, he would issue official instructions pointing out the means already available by sanitary authorities for obtaining, where needed, an increased supply of water, without the necessity of a special application to Parliament.

Mr. SCLATER-BOOTH: I may remind the honourable gentleman that a short time ago a digest of the sanitary law was issued to all urban and rural sani-

tary authorities, in which their existing powers in regard to water supply were clearly pointed out. When the bill now before the House becomes law another circular will be issued explaining its provisions, pointing out the further facilities which will be thereby provided. Moreover, in connexion with the circular on water supply issued the other day, I have caused more detailed information to be prepared as to the means of procuring and properly storing the water, and that is now under consideration with a view to being circulated.

Legal Intelligence.

COURT OF CHANCERY.—Tuesday, July 11.

(*Before the* Lords Justices of Appeal.)

SALVIN *v.* NORTH BRANCEPETH COAL COMPANY.

Mr. Henry Matthews, Q.C., Mr. Edmund James, and Mr. Trevelyan (of the Common Law Bar) were for the plaintiff; Sir Henry James, Q.C., Mr. Walker, Q.C., and Mr. Maclachlan were for the defendants.

This was an appeal from a decision of the Master of the Rolls. The bill was filed by Mr. M. C. Salvin, a gentleman residing at Burn Hall, near Durham, complaining of the effluvia issuing from the defendants coke-ovens, and praying an injunction. The defendants coke-ovens, over 250 in number, are situated at Littleburn, about 1000 yards from the plaintiff's mansion, and only 400 yards from the nearest plantation on the estate; and it was alleged, on the part of the plaintiff, that the smoke and sulphuric acid given off during the process of coke-burning are killing the trees in this plantation, and injuriously affecting the vegetation on the greater part of the estate. The defendants case was that coke-ovens are not to any extent injurious to vegetation, and certainly not if constructed on the plan adopted by them of passing the smoke under the engine-boilers and then up a tall chimney; and they denied that they had in any appreciable degree added to the normal condition of impurity to which the atmosphere of the district had attained when they commenced their works in 1871, laying stress on the fact that there are no less than 27 collieries, iron-works, &c., in full operation within a radius of five miles from the plaintiff's house. The Master of the Rolls thought the plaintiff had not made out his case, and therefore his honour dismissed the bill with costs. The plaintiff appealed.

Lord Justice James, in delivering judgment, said the Master of the Rolls, in his judgment, laid down what he thought to be the principle of law applicable to a case of this kind, a principle which he found in the case of *Tipping v. The St. Helen's Company*, in which Mr. Justice Mellor gave an elaborate charge to the jury, and the matter was afterwards very fully discussed in the House of Lords. The principle, as stated by the Master of the Rolls, was this—that the plaintiff was bound to show that there was substantial and visible injury done to him. The word "visible" had been very much quarrelled with in the argument upon the appeal, and it was said that the word originally used in the House of Lords was "sensible." His lordship did not think that there was very much difference between the two words. He thought that the Master of the Rolls was quite right. It seemed to him to amount to this—that when you had once established actual damage it was quite right to have recourse to scientific evidence to show the causes of it. But if you had to start with scientific evidence—to use, for instance, the microscope to show the existence of damage—that would not do. It must be such damage as could be proved by a plain witness to a plain common jury. It must be substantial and actual damage, not mere contingent and remote damage. The matter might be illustrated in this way. The law did not take notice of the gradual, imperceptible accretion to a river bank or the sea shore, although by lapse of time that accretion would become sensible. Just so in the case of a nuisance. It would never have done in the reign of Henry VI. to have forbidden the further use of sea coal in London, because it might have been foreseen that in the reign of Queen Victoria the roses in the Temple Gardens would have ceased to bloom. In the present case the injury alleged was not a mere sentimental one, not a merely contingent or prospective injury, but an actual nuisance, and the plaintiff's evidence was of the strongest possible description. But every fact and conclusion put forward by his witnesses was directly traversed by the defendants evidence, and the only thing conclusively established to his lordship's mind was the utter worthlessness of affidavit evidence in a case of this sort. The evidence was very carefully considered by the Master of the Rolls, and many of the witnesses were cross-examined before him, and, to a not inconsiderable extent, by him; and, after this careful examination, he came to the conclusion that the plaintiff had utterly failed to make out his case. His lordship thought that, whatever conclusion he might himself have come to in the first instance, upon the paper evidence, he could not overrule a decision at which the Master of the Rolls had arrived after such advantages and opportunities. His lordship did not think it would be advisable to send down any scientific persons to report upon the case. He should be very loth to stop a great work of this kind except upon the verdict of a jury, who would have an opportunity of seeing the *locus in quo* and the surrounding country, and before whom the witnesses would give their evidence in open court. Nor did he think it would be a proper course to direct an issue to be tried. If, hereafter, the plaintiff should find that a substantial injury was being done to him, he could bring an action, and no irremediable injury would be done to him by the delay. The plaintiff must be placed in the position of a man who had been nonsuited in an action at law for want of sufficient evidence. He would not be prejudiced in the future by an affirmance of the judgment of the Master of the Rolls. The appeal must be dismissed with costs.

Lord Justice Mellish concurred, and said there was no real difficulty as to the principles upon which this court should proceed in a case of this kind. The question was whether the plaintiff had made out that in an action at law he would obtain substantial damages for the nuisance alleged in the bill. The only difficulty was in determining how much that depended upon questions of fact and how much on questions of law. It was, of course, not true that the court would never interfere by injunction unless the plaintiff had proved that he had actually sustained substantial damage, because if it was clearly proved that he was just about to sustain substantial damage, this court would not wait until he had, but would at once interfere. But in cases of this kind you could not be certain that substantial damage would ever be sustained, and that was why the court would not interfere till substantial damage was proved to have been sustained. So, too, the words "visible injury" were not strictly correct, or it did not signify whether the nuisance was established, if it was satisfactorily established by the evidence of the eye or of the other organs of sense. But the injury in this case to the plaintiff's woods must be such as any fairly educated eye could see. In a pure question of fact like this the court ought not to disturb the decision of the Master of the Rolls unless it could see plainly that he had drawn a wrong inference of fact. His lordship could not see that the Master of the Rolls had not come to a right conclusion. When he saw the great difference which had been made in the evidence of those witnesses who had been cross-examined he did not think the court ought to decide in the plaintiff's favour upon the evidence of those of his witnesses who had not been put to that test. The real fact was that in affidavits witnesses stated their own opinions, and not the facts, so as to enable the court to form its own conclusions. His lordship thought it very important that persons should not be able to stop important commercial works when they had not got a case which they could present to a jury. The Master of the Rolls had come to a right conclusion on the evidence as it actually stood. Would it be just, by directing an issue, to commence now a totally new proceeding when it was not the fault of the defendants that an action had not been already brought by the plaintiff? The plaintiff could still bring his action hereafter, and his lordship had no doubt that it would be in ample time to stop any real injury.

Monday, July 13.

(*Before Vice-Chancellor* Malins.)

STEWART *v.* LUPTON.—PATENT GAS SHARES.

The plaintiff in this case sought by his bill to recover the value of 10 new shares in the Patent Gas Company, under the following circumstances. On the 13th of September, 1871, he purchased, through Messrs. Coates and Hankey, his brokers, of the defendant, 10 old shares in the company. The sale-note was the 13th of September; the name-day the 28th; and the settling-day the 29th. In the usual course the name of the plaintiff was handed to the defendant's brokers. It happened, however, that there was some little delay in taking in the transfer for registration. On the 4th of October, the defendant's name still remained on the register, and the company came to the determination to issue new shares in the proportion of one new for every old share held; and the defendant, owing to his name being on the register, had the 10 new shares allotted to him instead of the plaintiff, who had purchased them. The plaintiff's brokers applied for the new shares, but the defendant refused to deliver them. The bill, therefore, prayed that the plaintiff might be declared entitled to the value of the shares which the defendant had sold at a premium. The defence was that the case was one, not for equity, but for damages at law; that the plaintiff had proved he had sustained no injury, having got the value of his shares, and was indemnified as to costs.

Mr. Higgins, Q.C., and Mr. Montague Cookson appeared for the plaintiff; and Mr. Glasse Q.C., and Mr. Romer for the defendant.

Mr. *James Stewart*, the plaintiff, sworn and cross-examined by Mr. Glasse, said he bought the shares in question upon the recommendation of a brother-in-law of his, named Johnson. He had had several transactions in the shares, and was sorry that he had, for it had been unfortunate for him. On the 16th of November he sold 10 Patent Gas new shares, but he never got them. The new shares he sold were those he should have got.

By the Court: On the 16th of November he got the information that there were new shares in respect of the old shares he bought, and thinking himself entitled to them, he sold them.

By Mr. Glasse: He got the money for them, and did not repay it. He had sold and had received the money for the shares he was now seeking to recover from the defendant. He could not tell when he first gave instructions for the bill. Mr. Johnson asked his consent, but he had no note of it. He knew nothing of the details. He was not surprised to hear that the bill was not filed until January, 1872. Nobody had ever asked him to return the £70 for which he sold the shares. Mr. Johnson first asked him to file the bill. He said the shares were refused to be given up, and law proceedings would be taken to recover them. He knew Messrs. Abrahams and Roffey. He gave them no instructions to file the bill; Mr. Johnson was acting for him all through. He hoped he was not liable for the costs of the suit to his solicitors. He had never paid them any money in respect of it. After having given his consent to the filing of the bill, he took no further trouble about it. He made an affidavit last year, and did not make any alterations in it when it was sent to him by post. All his communications with Mr. Hankey came through Mr. Johnson. He did not give security for costs. He swore the affidavit from information, and not from personal knowledge. Mr. Johnson was the agent of the Bank of Scotland at Dumfries. He had been told by Mr. Johnson that he should be kept harmless as to costs. He did not know who employed Messrs. Abrahams and Roffey. He saw Mr. Hankey on Saturday last, when he came from Ireland, at the offices of Messrs. Abrahams and Roffey. He did not know he was to see him when he first went. He had some conversation about the bill in Chancery, but very little.

Re-examined by Mr. Higgins: He recognized his signature to the authority to file the bill, dated Jan. 19, 1872. He left everything to Mr. Johnson as to buying and selling shares. All his communications with Coates and Hankey passed through Johnson. He believed Mr. Johnson made a claim for him to the new shares. He never heard of the new shares until shortly before the contract note was sent to him by Johnson. Mr. Johnson wrote from time to time to him, saying what he was doing. Mr. Johnson was a brother-in-law of his; he married Mr. Johnson's sister.

By the Court: He received authority to file the bill by post from Mr. Johnson and sent it back.

Mr. *John A. Hankey*, sworn and cross-examined by Mr. Glasse, said he was a member of the firm of Coates and Hankey. He attended to the business outside the Stock Exchange, and his partner attended to it inside. He first knew the bill was going to be filed about the time it was filed. Mr. Johnson and his firm consulted about it. Mr. Johnson wrote to them upon the subject. He had got plenty of his letters on the subject, but they were not in court. He knew that the plaintiff asked to be indemnified as to costs. He did not know that the plaintiff was called upon to give security. He believed a bond was given; he heard Mr. Roffey say so just now. His firm might have given it.

Mr. Higgins produced the bond given by Coates and Hankey.

Cross-examination continued: The plaintiff applied to be indemnified for costs. He applied to Mr. Johnson, and his firm, as persons of honour, had given their word that they would be liable as to costs. They were interested so far as this, that not being able to obtain the shares from Mr. Lupton for their client, Mr. Stewart, they found the shares for him, and he sued Mr. Lupton for the shares. They bought 10 new shares and gave Mr. Stewart the proceeds of them when they were sold. If anything should be recovered from Mr. Lupton it was to repay their firm for the 10 shares they had bought.

By the Court: They bought the shares for Stewart. They thought they had bought them of a broker, who would fulfil his contract. He did not, and therefore they bought the shares at a very considerable loss.

Cross-examination continued: He could not tell the exact day they bought the 10 shares for Stewart. Messrs. Abrahams and Roffey had been his solicitors in several cases. Either he or his partner gave instructions to file the bill.

By the Court: Philpot sold the shares, and Julian was the agent of Lupton.

Cross-examination continued: It was not the custom of the selling broker to hand back the ticket. Therefore, if it ever got into Julian's possession, it would have remained with him in the ordinary course. He did not see Philpot hand the ticket to Julian.

By the Court: His firm handed in the name-note, and, in the ordinary course it would go to the broker on the other side.

Cross-examination continued: Philpott must have handed the note to Julian, or his firm could not have got the shares they bought. [The bond of indemnity was produced.] That was signed by him and his partner. He had forgotten that, and thought the money was paid into court. He knew the shares were 9801 to 9810, because his clerk informed him so. He thought that clerk was Rowman. He had no knowledge on the subject, except that obtained from his clerk. He never saw the books of the company. The reason why the Stock Exchange did not take the matter in hand at once was because the solicitors had written letters. He had heard there was an action against Lupton in respect of shares in the same company. He only began to deal in shares in the Patent Gas Company in the beginning of the first week of September, 1871. He had not had many transactions in the shares at that time, but he had afterwards. He thought the first transaction he had in the hares was at 5 or 6 prem. The transaction in question was not the

first. He bought some shares for himself at 6 prem., and got the new shares. The person from whom he bought the old shares gave them to him. On the 26th of October, although he had bought shares, he had not a single client who was registered. They bought from dealers on the Stock Exchange. He did not buy or sell shares for Mr. Ogle in the month of September or October, 1871. Mr. Ogle was the chairman of the directors, he believed. He was in the habit of seeing Mr. Ogle afterwards. He had not looked at his books lately to refresh his memory. He told Mr. Johnson in writing that, as men of honour, they would hold Mr. Stewart harmless as to costs. He would pledge his oath that, to the best of his belief, neither directly nor indirectly, did he know before Oct. 26, 1871, that new shares were to be issued to the old shareholders of the company. His impression was that the new shares began to be dealt in at 10s. premium, and they went up gradually. It was thought the company would be a great success at that time. The principle was to make gas at a low heat instead of a high one, and better gas at a lower price. He did not recollect the value of the new shares on Oct. 26. There was no market value for them now. They wrote to Scotland stating that there were new shares issued, and received an answer that it was wished to have them, and they applied in writing to Mr. Julian for the new shares on the 4th of November.

Re-examined by Mr. HIGGINS: He believed his firm made application at the offices of the company on Nov. 2. He told Mr. Johnson he would hold the plaintiff harmless of the result of communications between them. He paid £5 premium for the new shares in order to hold the plaintiff harmless. He believed they were out of pocket £800 by supplying the shares. The present was a representative case. They had several claims upon Lupton. They had no difficulty in getting new shares in right of old except from Lupton. Lupton was a member of Lloyd's at the time, and, for aught he knew, he might be so still. He thought it was in November, 1871, when the transaction was brought before the committee of the Stock Exchange.

Mr. *George Bowman*, sworn and cross-examined by Mr. Glasse, said he was clerk to Coates and Hankey, and had been in their employ something more than three years. He was acquainted with dealings in the shares of the Patent Gas Company. He first became acquainted with them in September, 1871. He did not know Mr. Ogle. He was nearly certain that Ogle had no transactions through Coates and Hankey in September, 1871, in these shares. He first knew that new shares were to be issued on or after Oct. 26. He knew it from checking the bargains. He had not heard before that they were going to be issued.

By the COURT: Down to the 26th of October, 1861, sales of the shares were uniformly treated as carrying with them the right to the new shares, but shortly afterwards the shares for the first time were quoted "ex new."

Cross-examination continued: Until a thing was "ex new" it carried the new. All that they bought before the 26th of October he believed carried the new shares. He did not see Philpott hand the note to Julian. He gave it to Julian. He knew he did by the name written on the back. Somebody in their office had written Philpott's name, and somebody in Philpott's office had written Julian's name. Mr. Hankey was not so well acquainted with the details of the business as he was. Every transaction that occurred before the 26th of October carried the right to the new shares.

By the COURT: Whenever shares were bought in a company they always carried new until they were quoted "ex new." Some shares bought at the same time as those now in question carried the new, and they got them a little after the 4th of November.

Re-examined by Mr. HIGGINS: It was usual to write in pencil on the back of the ticket the names of the members of the house through which the ticket passed.

At this stage the court rose for the day.

TUESDAY, JULY 14.

Mr. L. T. Lupton, the defendant, sworn and cross-examined by Mr. HIGGINS, said he sold some of the new shares in the Patent Gas Company before the 26th of October, 1871. He could not say whether he sold them on the Stock Exchange or not. He had sold new shares off the Stock Exchange. He got 5s. premium for the shares sold before the 26th of October, 1871. He should say it would be between the 13th and 26th of October. The new shares were never legally quoted on the Stock Exchange; they were never put in the list.

By the COURT: They were never quoted at any time in the list.

Cross-examination continued: There was never any settlement for the shares, and they did not come regularly on the market, nor did the old shares. The highest price he got for any of the 15 shares he kept was £3. He received both the circulars sent by the company as to the issue of new shares. He bought some new shares through Mr. Julian before the 26th of October, and thought he was bound by the 101st rule of the Stock Exchange, and was bound before that date to deliver the shares, and he did so in every other instance.

The VICE-CHANCELLOR, in delivering judgment, said he considered the plaintiff had completely made out his case; and that he was entitled to the shares which the defendant had refused to deliver. He should certainly not send the plaintiff to law; but considered he had full jurisdiction to deal with the case under Lord Cairns's Act; and regretted that the matter had not been disposed of by the committee of the Stock Exchange. It was said that the plaintiff was indemnified. No doubt the bill was filed by the plaintiffs authority, and he was liable for costs, although Messrs. Coates and Hankey, acting as honourable men, had taken the responsibility on themselves. He could only look to the plaintiff on the record, and must overrule the objection. He should make a decree against the defendant, as prayed by the bill, and order him to pay all the costs.

CLERKENWELL COUNTY COURT.—WEDNESDAY, JULY 15.

(*Before* H. R. BAGSHAWE, *Esq., Q.C., Judge.*)

THE IMPERIAL GAS COMPANY *v.* HAMMOND.

This was a claim by the above gas company against the defendant, arising out of rather peculiar circumstances.

Mr. WILLOUGHBY (of Messrs Willoughby and Cox, of Clifford's Inn) appeared for the company; and Mr. POPHAM appeared for Mr. Hammond, the defendant.

Mr. WILLOUGHBY, in stating his case, said that the action was brought for 24,500 feet of gas supplied from the 29th of December of last year to the 27th of March in the present year. The defendant had written many letters to the company pointing out that, according to the number of lights he burned, the consumption was excessive. The gas was taken by the defendant's own meter, over which the company had the usual legal control. On the 29th of December, the index of the meter showed a consumption of 56,400 feet. On the 27th of March the company's inspector called to see it, and he found that the index stood at a position in which it was impossible to be accurate. Mr. Willoughby produced a meter index, and explained to his honour that there were three wheels, the one representing hundreds of feet, the other thousands, and the third tens of thousands. The second wheel should make one revolution to ten of the first, and the third wheel should make one revolution to ten of the second. On looking at the back of the index it would be observed that each wheel had a small spindle which should have six teeth in it. That acted upon the larger wheel, which had 60 teeth. On the 27th of March the meter having been in a position between 7 and 8 in the largest wheel, and the next wheel at zero, it was quite plain that it could not be accurate, and after some consideration, and at the defendant's own request, the meter was taken down and sent to Mr. Sporne, the City of London gas inspector, who discovered that there was an error in it The error was that the largest wheel, that registered the most consumption, had 63 teeth in it instead of 60, and the result of this was that the wheel next to it made 10½ revolutions to make one complete revolution of the larger wheel. Upon that Mr. Sporne made a calculation, and he found that the true state of the meter at that date should have been 80,200 instead of 70,200. The company accordingly charged the difference between those amounts, and they also charged something more, which he thought there would be no dispute about, when the new meter was fixed. From the 18th to the 27th of March they charged for 700 feet more. The defendant had given notice to produce a statement of the consumption of the meter since it was fixed, and from that statement it appeared that the average seemed to be much about the same for that particular quarter. The company had lost by the inaccuracy of the meter about 20,000 feet. However, they said nothing about that. There was no dispute between the company and the defendant as to the price of the gas.

Mr. POPHAM: The only dispute is about the 10,000 feet. We have gone through the corresponding quarters, which are £3 11s., £3 14s., &c., while the quarter in question was £5 10s.

Mr. WILLOUGHBY said that 3s. 9d. was the former price, and that 4s. 8d. was now charged, which would partly account for the difference in the last quarter.

The first witness called was

Mr. *Newell*, who said: I am inspector of the gas company. I examined the meter at the defendant's house on the 29th of December, 1873. The state of the meter was then 56,400.

Cross-examined by Mr. POPHAM: I believe the meter was accurate at the time. Nothing was said to me about its being inaccurate.

Mr. *Henry Sporne* was next called. He said: I am the gas-meter inspector for the City of London, and am appointed under the Sales of Gas Act. I recollect the meter in question (No. 189,345) being brought to me on the 1st of April. I tested it, and found it to register 4 per cent. slow, or 4 per cent. in favour of the consumer. There are various causes to account for a meter registering slow. In this particular case possibly there was a little deposit upon the surface of the valves that would cause it. I found something wrong with the 100,000 wheel. I was requested by the Imperial Gas Company, after I had tested the meter in the ordinary way, to take it apart, to take out the index, and to examine it, as there was a suspicion that something was wrong, and the condition of the hands was not relative. The dials had all to work in a relative action the one with the other, but the hands on that day stood in a very awkward position, indicating some error, either a slip of the hand, or one of the hands loose or otherwise; but after the index was taken off I found that the hands were perfectly secure and tight, and then I had to proceed further to get at the discrepancy. I found on examining the index that the 1000 and the 10,000 dial wheels were perfectly correct; but when I came to the 100,000 dial I found, to my astonishment, that there were three cogs or teeth extra in that wheel, thus making the meter to register 5000 feet less in every 100,000 feet. That is, the 100,000 dial did not work up quickly enough; it did not register the amount of 5000 feet as against 100,000 feet registered, so that if 400,000 feet were put through that individual meter, in the course of four revolutions the gas company must be the losers of 20,000 feet. I made an examination to find out what the meter ought to have registered on that day. I should have read it at 702,000, but following up my examination I found that the indicator on the 100,000 dial had moved so slow that if the meter had been taken at what it really ought to have been taken it would have stood at 802,000, making a difference of 10,000. During two revolutions the company would lose 10,000 feet.

Cross-examined: The meter was out of order. I should consider the wheel was put in when the index was made. I said, with reference to the meter registering 4 per cent. slow, that there might be a deposit on the valve; but that is another feature altogether. I never searched for any deposit. The deposit would not have anything to do with the wheels whatever; it would simply be a loss to the company, the gas escaping through a slight deposit upon the surface of the valves. I could not say when the meter might have been repaired. I am not sure if the date was on it, but I fancy it was dated 1861. Ten years would not be old for a meter. A meter of that description would last for 20 or 30 years, with good repairing. When I examined it, the meter was in very good condition.

His HONOUR: It is strange, if the meter is by an excellent maker, that there should have been that mistake in the wheel.

Mr. WILLOUGHBY suggested that the meter might have been repaired, and the repairer might have altered the wheel.

Cross-examination continued: The index hands were quite tight. There was no chance of their slipping. The wheels were all in perfect order.

Re-examined: The mistake of the meter was against the company, not against the consumer. I have examined a great many meters in my time, but never saw one with three teeth less.

Mr. *Henry Carter:* I am inspector to the gas company. I examined the meter at the defendant's house on the 18th of March. It stood at 70,200 or 80,200, I forget which.

Cross-examined: I saw Mr. Hammond on this occasion, and had some conversation with him about the meter. He complained of the last quarter being heavier than the December quarter. He said he thought the meter was wrong, as it registered too much against him. He called my attention to corresponding quarters of previous years. I believe he told me the habits of the house were the same, and that no extra gas had been consumed. On the 25th of March he paid me the December quarter, amounting to £5 2s. On his paying that he disputed the amount, but he said he would pay it then, and have the meter tested, and, if it was found to be correct, the account would remain as it was, but, if incorrect, he would be allowed for it afterwards. I said, "You had better pay the 10,000 feet, and we can see the meter and have it examined." I only examined the index of the meter. It is not my duty to look inside.

This concluded the case for the plaintiffs.

Mr. POPHAM, in stating the case for the defendant, said that his client did not dispute the amount so much for the sake of money, as he did it on principle. He had compared the corresponding quarters of other years, and had found that the accounts varied from £3 10s. to £3 14s.; but, to his great surprise, notice was sent in in December that he had actually consumed gas to the amount of £5 11s. 1d. He knew that his establishment had been kept the same—that there had been no extra lights—and he felt that the company had made some mistake in charging him so much. He, however, paid the account, including the 10,000 feet, to the collector, but under protest, and the matter stood over to next quarter. The company then went into the affair, and, taking the meter as they did, made a further claim of £5 14s. for the March quarter. It was quite clear, from the examination of Mr. Sporne, that there was something wrong with the meter, but it was very singular that it was only discovered on that identical occasion. It ought to have been discovered before by the persons belonging to the gas company. He would call a gentleman who examined the meter about six months ago, who calculated, from an inspection of the meter, that the consumption would be something like 30 feet an hour, or about 20,000 a quarter, and not 30,000, as charged by the company.

Mr. *Horatio Hammond:* I am the defendant in this action, and reside at Belmont House, Dalston. I have resided there about six years. During that time I have been supplied with gas by the Imperial Gaslight Company. Previous to last December quarter, the former winter quarters averaged about £3 10s. during the whole six years. After the meter was taken in December, I had a notice sent in to the effect that my gas account amounted to £5 2s.

When the collector called on the 25th of March I paid him that amount under protest. I had a discussion with him as to the state of the meter, which was to have been taken down and examined. We retire between eleven and twelve o'clock at night, and have always been in the habit of doing so. From September to December I burned two lights less than usual. From December to the 27th of March I have also burned two lights less; and for the six months ending the 25th of March I have burned two lights less than the previous year. I do not understand meters myself. In consequence of the previous year only being £3 10s., and there being no extra consumption of gas, I object to pay the £5 13s. that the company sues for now.

Cross-examined: When the accounts amounted to £3 10s., the gas was calculated at 3s. 9d. per 1000. Calculated at 4s. 8d. (the increased price) it would be £4 8s. 6d. The meter in question was my property. I have not got it now. Having heard Mr. Sporne's statement, I believe the meter measured 10,000 feet too much in December. I do not agree with Mr. Sporne that I have been paying less than I ought to have paid.

Re-examined: The registration of the company's meter which I have now corresponds to that of previous meters.

By His HONOUR: The last examination paper is dated the 17th of June. I have not compared papers for the purpose of ascertaining whether that taking corresponds with the previous quarters from March to June.

Mr. *Walter Bawdon:* I am a gas-fitter. I did not examine the old meter, but I have examined the present one. According to the number of lights Mr. Hammond burns, it registers about 30 feet per hour, or 180 feet per night, which would amount to about 20,000 feet per quarter.

Cross-examined: The company claims 24,500, so that the sole difference between their estimate and mine is 4500. I know nothing of the old meter at all. I remarked that I did not see why it should register the two last quarters more than the previous ones. If it was wrong at one time, I thought it would be wrong at another. I was surprised that the three additional teeth in the large wheel had not been detected by the inspectors. I cannot give an opinion whether three teeth less would be in favour of the company or the consumer.

His HONOUR: I understand Mr. Sporne to say that for every 100,000 there would be a loss of 5000 to the company. Is that so?

Mr. WILLOUGHBY: Yes.

His HONOUR: And therefore it is calculated to be 10,000 for this quarter. I do not see that.

Mr. WILLOUGHBY: There is 24,500 registered; that is 2-10ths.

Mr. *Sporne* recalled, said: Mr. Bawdon said he was astonished that the inspectors could not detect the matter, but it would have taken me three months to have tested the meter.

His HONOUR: Assuming your account to be right, the whole amounts to 80,200 altogether, and for every revolution of 100,000 there is a loss of 5000 to the company?

Witness: Yes; the error could only be detected in the revolution of the 100,000 dial. At the rate of a consumption of 20,000 on an average per quarter it would take a long time to discover the error.

His HONOUR: And Mr. Hammond has been paying short for a number of quarters, and you have thrown it into this particular quarter?

Mr. WILLOUGHBY: Yes; because the error was just then detected

Mr. POPHAM: We only understood it to be for one quarter.

Mr. WILLOUGHBY: We only claim for one quarter.

His HONOUR: I do not understand that the revolution of 100,000 has been completed at all.

Mr. WILLOUGHBY: It has been completed four times. The meter has been up some years.

His HONOUR: Now you are in the fifth time (80,200), or it might be the sixth time; it is in the course of completion, and when it is completed the company will have lost 10,000?

Witness: Yes. They have not reached the 100,000. The meter had been round 100,000, and it is now completing the second, and we found the hand so much beyond its point. The first time the distance would be so small that the inspector would not detect it, but when it is coming round a second time, the distance being greater, he would be the better able to detect the relative position of the hands. The inspector read the meter at 702,000, but when it was brought to me, and I observed three extra teeth in the wheel, I came to the conclusion that it should have stood at 802,000.

His HONOUR, after hearing the evidence, said it was clear that there had been an increased consumption of gas somehow or other. He could not withstand the evidence which had been adduced by the plaintiffs, for whom he must give judgment, with costs.

HAMMERSMITH POLICE COURT.—FRIDAY, JULY 17.

(*Before Mr.* INGHAM.)

DAMAGE TO GAS-MAINS BY SEWERS CONTRACTORS.

Messrs. *James* and *Samuel Williams*, contractors, of Shepherd's Bush, were summoned by Mr. Williams, on behalf of the London Gaslight Company, for the sum of £9 14s. 3d., being for damage to the mains and wasting of gas.

Mr. WILLIAMS said the defendants constructed a sewer in Fulham, and it was during the progress of the works that the mains were damaged; £2 0s. 6d. of the amount was for the loss of gas.

The defendants were represented by their clerk, who said they had never paid for the loss of gas before.

Mr. *Pearce*, one of the company's inspectors, said his attention was first called by a large escape of gas into a house. Two of the main-pipes were damaged, and the loss of gas had been under-estimated.

Mr. INGHAM referred to the Act, and said if the defendants wasted gas they must pay for it.

The CLERK said that no company had charged for loss before.

Mr. *Pearce* said the defendants were willing to pay for the damage, but not for the loss of gas.

Mr. INGHAM made an order for the payment of the full amount, and 2s. costs.

Miscellaneous News.

EUROPEAN GAS COMPANY, LIMITED.

The Annual General Meeting of the Shareholders in this Company was held on Wednesday, July 15, at the Offices of the Company, 11, Austin Friars, London—WILLIAM WHITE, Esq., in the chair.

The GENERAL MANAGER (Mr. H. M'L. Backler) read the notice convening the meeting and the report of the directors, of which the following are the principal passages:—

Your directors have to report that a large reduction of profit has taken place at each station, in consequence of the high price of coals compared with that paid in the preceding year, when old contracts, secured previous to the rise, were still in operation to a large extent. The differences vary considerably at the stations, according to the greater or less facility for forwarding contract coals; failing which, other descriptions had to be provided on higher terms.

This heavy additional charge has, however, been partially compensated by profit on sale of coals for which an opportunity occurred during the prevalence of extreme prices, and of which the company were enabled to take advantage by the ability and energy of several of the managers in France. The sum thus realized amounts to £6877 13s. 11d.

New contracts have recently been effected by your directors, on conditions which assure a very large reduction in the cost of coals during the current year. The value of coke is still maintained, in some special cases, but, generally, the tendency is towards a decline in price.

The increase of gas-rental has not been so important since the last annual meeting as in former years. This is due to the paralyzing effect on trade of the political state of France.

Under such circumstances it is satisfactory to report that the falling off in the sale of gas to industrial and general business establishments has been more than covered by the supply to new consumers.

The only feature requiring particular notice is, that an addition of 7 years to the company's exclusive privilege at Caen has been obtained, thereby extending the term to Dec. 31, 1914. In consideration of this advantage your directors have agreed to enlarge the area of supply, so as to include an adjoining district, in which the demand for gas has already proved of some importance.

The total net profits for the year ended March 31, 1873, were	£36,787	4 3
And on the 31st of March last	£29,531	14 1
Add profit on sale of coals	6,877	13 11
	36,409	8 0
Decrease	£377	16 3

The charge for interest on debentures having been reduced by £469 16s. 7d., and the transfer fees having yielded £7 10s. more, the final result shows an increase of £99 10s. 4d. This enables your directors to propose the declaration of a dividend at the rate of 8 per cent. per annum, together with a bonus of 2 per cent. on the fully paid-up shares, as also on the new shares (1862 issue), £5 paid, during the whole of the year, and £2 10s. during nine months only, from the 1st of July, 1873, to the 31st of March, 1874.

After providing for this, a sum of £113 13s. 10d. will remain, which, with £1208 5s. 3d. interest on the balance of general revenue account will make £1321 19s. 3d. added to last year's total, representing the reserve of undivided profits.

The recent creation of shares (1874 issue) will participate in all future dividends, commencing with that payable on the 1st of February next, out of earnings since the 31st of March last.

Your directors consider this undertaking to be now free from the consequence of the excessive charges for coals and materials which prevailed over the greater part of two years, and feel they may safely congratulate the shareholders on having passed so satisfactorily through a most trying and difficult period.

This could not have been achieved without careful and vigilant management, added to constant readiness and ability, exercised in securing advantages such as that derived from the sale of surplus coals, which has greatly contributed to the present dividend.

Your directors are hopeful that the trade of France will soon revive sufficiently to effect a renewal of prosperity in the provinces, by which the interests of this company cannot fail to be benefited.

Meanwhile all outlay not actually indispensable is suspended, and the general expenditure kept within the narrowest limits consistent with perfect efficacy.

Notice has been given that two of your directors (Walter Thomas Fawcett, Esq., and Thomas Chaloner Smith, Esq.) and both auditors (William Jones Lewis, Esq., and George Harrison, Esq.) retire from office at this meeting, but, being eligible, offer themselves for re-election.

The CHAIRMAN: I think, gentlemen, our report requires some little explanation—and I will endeavour to give it you as far as I can—as to the position in which we stand. It may be, perhaps, for the benefit of the new shareholders, who do not quite understand the mode in which we usually make up our accounts. I may state, therefore, that before we put forward the profits, which you have heard read to-day, we take 5 per cent. as the natural value of the interest of our money. This interest we bring into account in a lump sum. We then look at the remainder as the profits of the year, and these are the profits which we return to you—those in excess of 5 per cent. at each station—except in the case of Caen this year, where, as you have heard, the returns do not show 5 per cent. It seems somewhat formidable, on the present occasion, that we have to report a decrease at so many stations; but, as you have heard, this decrease is nearly covered by the profit derived from the sale of coals which we had the opportunity of making. It has not been our usual practice to do this in past years, but having large stocks and considerable contracts, we availed ourselves of the opportunity, at the most critical period of our affairs, and this has enabled us to add a large amount to our profits, and thus maintain the dividend which must otherwise have been temporarily reduced. We have in this way escaped what many other companies have not escaped—a diminution of our dividends. For, like other companies similarly situated, we have no means of raising the price of gas, having made contracts for fixed prices during the continuance of our concessions. And here I may remind you of a statement in the report, that we have been successful in obtaining an addition of seven years to our concession at Caen. Although that station seems at present to be more under a cloud than any of the others, you will, I think, soon find a large improvement in the company's business there. We shall have to erect another tank and gasholder there before long, and that I believe will be the largest outlay required, at any rate at that station. We have made considerable contracts for coals for the coming year, as we think we should take advantage of the very large decrease in price that has taken place, and by so doing we conceive that we have put ourelves in a most excellent condition. The reduction in the net cost is so large, that we, as your directors, feel we are put at our ease, so far as recovering the amount of profit lost by the heavy cost of coals during the last two years. Whether we earn anything by the sale of coals or not, I think we see our way to get up to the rate of profits realized before the great rise set in. It must be very satisfactory to the shareholders to know that notwithstanding the troubles we have had to pass through, we have come out of our difficulties without damage, or, in plainer words, without reduction of dividend, while at the same time we add more than £1300 to the reserve of undivided profits. I venture to anticipate that it will occur to the minds of some of the shareholders to inquire how the dividend on the large additional capital which we have lately created is to be provided for. It is hardly likely that the profits will so suddenly increase as to be of sufficient amount for the purpose; and in order to set your minds at rest on the subject, I will state at once that it is not the intention of the directors in future to set aside annually so large an amount as they have done hitherto for reserve and depreciation and redemption. This would be excessive now that the whole of our property is secured by exclusive privileges for long terms of years. This alteration of arrangement will give us something like £11,000 a year, and we know to a certainty, as we have made our contracts, what will be the effect of the large reduction in the cost of coals. We therefore believe, if all goes on well, that we shall not only maintain our present dividend of 8 per cent., but that, at the end of the year, we shall have a bonus. I have no doubt we shall continue to pay 8 per cent. on the large amount of extra capital, and that, as I stated at the last meeting, we may also have to pay a moderate bonus as well. This announcement, I am sure, will be satisfactory to the shareholders and to all concerned. Further than this I cannot state, without professing to be a prophet, and I have no pretensions to be one. I have endeavoured to forestall some questions that might be put to me, but, if any further information is required, I shall be most happy to afford it. I will now, with your permission, move—"That the report of the directors be received and adopted."

Mr. FAWCETT seconded the motion.

A SHAREHOLDER: Will the new shares recently created participate equally with the old shares in the bonus?

The CHAIRMAN: Yes, equally; they are on an equality in every respect. Our year begins on the 1st of April, and from that date the new shares participate with the other shares in the profits of the company, in proportion to the amount paid up on them.

A SHAREHOLDER: What is the average price of gas supplied by us?

The GENERAL MANAGER: 5s. 2d.

The motion was put, and agreed to unanimously.

The CHAIRMAN: I have now to move—"That a dividend at the rate of 8 per cent. per annum be declared on the old and on the new shares of 1862 issue, the first moiety thereof having been paid on the 1st of February; that the second moiety thereof be paid on the 1st of August, together with a bonus of 4s. per share on the old shares and 2s. 9d. per share on the new shares of 1862; the whole out of interest and profits, free of income-tax."

Mr. FAWCETT seconded the motion, which was put and carried unanimously.

The retiring directors, Messrs. Fawcett and Chaloner Smith, and the retiring auditors, Messrs. Lewis and Harrison, were severally re-elected.

On the motion of Mr. STOKES a hearty vote of thanks was given to the directors for their efficient management of the affairs of the company.

The CHAIRMAN, in acknowledging the vote, said: Gentlemen, your directors, as upon former occasions, desire to express their obligations to you for passing this vote of thanks. We have not had a very easy time of it during the last two or three years, but we have kept our shoulders to the wheel, and taken care that everything should be done to keep up the value of this concern in every way. We thank you for so kindly recognizing our services on this occasion, and I can only repeat what I have often said before, that we shall continue in the future the same course of careful management, and we trust that we shall be rewarded with the same results as those which have attended our labours for many years past.

Mr. T. N. STOKES moved a vote of thanks to Mr. Backler for his continued attention to the interests of the company.

Mr. C. WHITEFOORD seconded the motion.

The CHAIRMAN: Gentlemen, previous to putting this motion I think it would be well to inform the shareholders generally that we have recently made an alteration with reference to the position of Mr. Backler. That gentleman has for many years borne the burden and heat of our affairs, and he naturally wanted to be relieved a little from the heavy work incident to his office. We have, therefore, created him the general manager and superintendent of the company, and have thus released him from a great deal of the close attention to office business which his duties of secretary demanded.

The motion was put and carried unanimously.

The GENERAL MANAGER: Gentlemen, I thank you very much for the resolution you have just passed in my favour. As the chairman has said, I have for the last 24 years served this company faithfully and to the best of my ability, and I think the time has now come when I may claim a little more ease than I have taken to myself in the double office I have so long held. It was, therefore, my proposition to the board that I should be relieved of the mere secretarial duties, and retain the post of general manager of the company. It is my intention to show the same interest, and to devote myself to your affairs just as if I actually continued to do the work which will now pass into other hands. I shall feel, so long as I am enabled to remain here, that, the best of my life having been devoted to this company, the remaining portion of it shall be so employed as to realize the greatest benefit it is in my power to secure for your advantage.

The proceedings then terminated.

PRESENTATION OF A TESTIMONIAL TO MR. WILLIAM MANN.

One of the results of the amalgamation of the City of London Gas Company by The Gaslight and Coke Company has been the closing of the Blackfriars works as a manufacturing station. Mr. William Mann, who for many years was the engineer-in-chief of the City Gas Company, and who since the amalgamation has filled the office of superintendent of the Blackfriars station, has just retired from the service of the company. It was felt by the principal officers with whom he had been so long associated that advantage should be taken of this circumstance to present Mr. Mann with a substantial token of the high estimation in which he is held. A subscription was accordingly set on foot for the purpose, to which a few outside friends in the gas world added their contributions. In this way a sum of about two hundred and fifty guineas was speedily raised, and this amount was laid out in the purchase of an elegant timepiece, a silver tea and coffee service, and a massive silver centre-piece. These, with a suitable address engrossed on vellum, elaborately illuminated and framed, were presented to Mr. Mann, at a dinner given to that gentleman at the City Terminus Hotel, Cannon Street, on Wednesday evening last. Mr. R. JONES, engineer of the Commercial Gas Company, presided; Mr. H. BROTHERS, superintendent of the Kensal Green station of The Gaslight and Coke Company, acted as vice-chairman, and there were present on the occasion, among others, Mr. Aird (of the firm of Aird and Sons), Mr. Crookenden (Phœnix), Mr. J. Johnson (Blackfriars), Mr. A. Kitt (Pimlico), Mr. Morris (Brentford), Mr. Morton (London), Mr. G. C. Trewby (Beckton), Mr. P. J. Wates (Greenwich), Mr. C. Woodall (Phœnix), Mr. V. Wyatt (Westminster), Mr. Sugg (Westminster), &c. Mr. Harris (Bow Common), who had taken a deep interest in the arrangements, was unavoidably absent through illness; and letters were received from several friends expressing their regret at not being able to attend.

After dinner, the usual loyal toasts having been given and duly honoured, the health of Mr. Mann was proposed. In proposing it,

The CHAIRMAN said: Mr. Vice-Chairman and gentlemen,—Before I address myself to what will be considered the toast of the evening, I must make a few remarks with respect to myself individually. When I came into the ante-room, and was asked, without any previous intimation, to take the chair, I felt that, on so interesting an occasion, the duties of this office should have fallen to some one better qualified than myself, and that, to do justice to the object you have in view, some one more intimately acquainted with the esteemed friend in whose honour we are met should have been selected. I was, indeed, given to understand that such really was the arrangement, and that it was expected Mr. R. J. Millar, the late secretary of the City of London Gas Company, would preside. In his absence, I must ask you to make every possible allowance for my unprepared state, and to grant me your indulgence if I fall short of the task which, upon such short notice, I have undertaken. I offer you this apology and explanation because I feel that this is an occasion of so much importance that the best man amongst us should be selected for the post. I could have wished that a larger number of gas engineers were present this evening, for the simple reason that I do not know a man connected with the gas world who is more deserving of esteem and regard than our friend, Mr. Mann. He has for many years occupied the position of engineer to the second oldest works in the metropolis in point of existence, and certainly only the second in point of importance. We have all known Mr. Mann for a long period of time, and we have known him to be a gentleman who, whilst he possessed every qualification for the post which he filled, has never put himself forward in any way, or made himself objectionable in the slightest degree, to any of his brother engineers. He has been always most accessible to every one of us, and, whenever his knowledge and great experience could be of service in the profession, he has proved himself ever ready, in the most agreeable manner, to give us the benefit of it. For myself and for others of his colleagues in London I may say that Mr. Mann has on more than one occasion shown us the way to effect improvements in connexion with our works, and has himself led the way in carrying them out. In connexion with the extraction of ammonia from gas, Mr. Mann holds the first rank, for it was he who showed us how, by very simple means and methods, we could get more ammonia than most of us at that time were obtaining from it. And he was never selfish in his attainments, for in this and other matters he freely gave us the result of his knowledge, and by printed descriptions and drawings supplied us with details of the methods which he had in practice found to be successful. I mention this matter particularly because I, and I dare say most of us, have felt at times the necessity for some such assistance. It is always pleasant when we feel that we fall short of what we desire to accomplish, if we can go to some one of large experience who is willing to let us share in the benefit of his advice. Mr. Mann, as I said before, has filled a very important position, and he has discharged its duties in a very amiable manner. By the force of circumstances—because he is anything but a used-up man—he is retiring from the profession—i.e., from the management of gas-works. I was going to say I almost wish it was my own case, for I sometimes feel a longing to retire from active service. Let us hope that this retirement will be for his own benefit. (Addressing Mr. Mann, the chairman continued:) We have met here this evening, sir, feeling that we could not allow you to depart from amongst us without some acknowledgment of the esteem and regard which we entertain for you. The gentlemen who are present, and many who are not present, desire to express their friendship for you, and to do so in a substantial manner. I only regret that the managers of this testimonial somewhat circumscribed it. They wished to keep it within the circle of gas engineers, but this they were powerless to do, and I see before me now some who have subscribed to the testimonial who do not belong to that body. I am sure if it had been admissible to widen the circle, a much larger amount would have been obtained, because there are numbers who would have desired in this way to assure you of their high esteem. I am made the mouthpiece of the subscribers this evening, and am deputed by them to ask your acceptance of the magnificent tea and coffee service which is on the table, also of a very splendid clock of most artistic design, and an elegant silver epergne. I trust you will receive this testimonial with as much pride and pleasure as it affords me, on behalf of the subscribers, to present it to you. The inscription upon the testimonial will convey to you the sentiments of every one who has been privileged to join us on this occasion. It is as follows:—

Presented to

WILLIAM MANN, Esq.,

By his brother engineers and other friends, as a tribute of respect and esteem for his uniform kindness and courtesy during his long and honourable career as engineer of the City of London Gas Company and as superintendent of the Blackfriars station of the Gaslight and Coke Company. July 15, 1874.

They have also recorded their sentiments towards you on the beautifully illuminated scroll which accompanies the testimonial:—

TO WILLIAM MANN, ESQ.

Dear Sir,—We, your brother engineers and other friends, on the occasion of the closing of the Blackfriars station of The Gaslight and Coke Company, with which you have for so many years been connected, either as superintendent or as engineer of the late City of London Gaslight Company, wishing to mark our appreciation of your long consistent and honourable career as an engineer, and the esteem we entertain for your uniform kindness and courtesy as a friend, beg you to accept an English lever quarter timepiece, in ormolu case, mounted with allegorical ornamentation, and a tea and coffee service and centre-piece in silver, as some slight token of our regard, and we beg to assure you that in surrendering the active duties of your profession, and retiring into private life, you carry with you our good wishes, and we trust that for many years to come you may enjoy health and happiness, and that a life of conscientious duty and activity may be crowned with all the blessings that the goodness of Providence can bestow.

We are, dear sir, your sincere friends,

John Aird and Sons.	J. Johnson.	C. Robinson.
J. Beale.	J. Joicey and Co.	G. Robinson.
H. Brothers.	H. Jones.	W. Robinson.
T. Bush.	R. Jones.	J. Strand.
T. Carter.	T. N. Kirkham.	W. Sugg.
J. Church.	A. Kitt.	E. Therman.
S. Clarke and Co.	G. Livesey.	G. C. Trewby.
I. A. Crookenden.	R. J. Millar.	C. W. Walker.
F. J. E.	H. Miller.	H. C. Ward.
W. Fraser.	F. Morris.	P. J. Wates
H. Finlay.	R. Morton.	Westwood and Wrights.
H. Freeman.	J. R. Peill.	S. Williams.
R. A. Gray.	J. O. Phillips.	J. Wilton.
J. Hadland.	S. T. Prior.	C. Woodall.
J. Harper.	G. H. Ramsay.	V. Wyatt.
R. Harris.	A. Robinson.	P. De Keyser.
July, 1874.		E. A. Gruning.

On their behalf I beg your acceptance of these tokens of our respect, and I wish you long life and a happy, peaceful, and prosperous retirement. As representing the subscribers, allow me to shake hands with you. (Cheers.) The chairman concluded by proposing the health of Mr. Mann, and the toast was most enthusiastically responded to.

Mr. MANN, in rising to acknowledge the testimonial and return thanks for the manner in which his health had been drunk, said: Sir, it has been remarked that some men are born to greatness, while others have greatness thrust upon them. I never felt that I was born to greatness, and when I was told a short time ago of the kindness which was intended to be done me on this occasion, I could scarcely believe it. I knew there were gentlemen meeting occasionally in the old board-room at Blackfriars, and I was afraid there was something the matter. I said to my son, who is at the Kensal Green works, "Is there anything wrong with the stokers?" for I had not the least idea that their meetings had any concern with me—in fact, such a thing was as remote from my vision as the comet. It seems, however, that you have thought well of me; certainly, you have thought better of me than I have thought of myself. Perhaps that is the best thing that can happen to a man. I feel bound to thank you for your kind appreciation of me, and to thank the chairman for the remarks he has made about me. I have, as he said, been always willing to communicate to my brother engineers every information in my power, and if I have discovered anything, to make it known for the general benefit. But I certainly never expected any recognition of this sort; in fact, I am taken entirely by surprise; and I fear that you have been thinking too much of me. I thank you heartily for this magnificent present. You may depend upon it I shall take care of it so long as I have the power, and I have a son here, who, as one of my descendants, will, I believe, help to take charge of it when I have gone. But to thank you adequately for this mark of your esteem is quite impossible. It has come upon me so unawares that I can only make the common-place remark, "I thank you all round," and express the hope that when any of you retire from the profession you may receive a similar gratifying assurance of the respect of your brother engineers.

The CHAIRMAN said he held in his hand a number of letters which had reached Mr. Harris from subscribers who were not able to be present, expressing, in the strongest language, their high appreciation of the character and ability of Mr. Mann.

The VICE-CHAIRMAN gave some interesting particulars respecting the origin of the testimonial among the engineering staff of The Gaslight and Coke Company, and said that, having determined upon making a present to Mr. Mann on his retirement, it was felt that they ought not to confine the subscription to their own immediate circle, as Mr. Mann was so well known throughout the gas world. It became, however, necessary to put some restriction on the matter, or they would have had more money than they could well dispose of. His own knowledge of Mr. Mann extended over 16 years. When he first made his acquaintance he was himself at Manchester, and the question of purification of gas by oxide of iron was just coming into vogue. The chairman of the Gas Committee suggested that he should go to London and see the process in operation. He did so, and at the City of London Gas-Works he found the perfection of purification. He was there received most courteously by Mr. Mann, who not only explained every detail, but offered to supply him with material for experimental purposes. Mr. Brothers concluded by expressing the pleasure he felt in seeing Mr. Jones in the chair, and calling upon the company to drink his health.

The CHAIRMAN appropriately responded, and proposed the health of the vice-chairman.

Mr. BROTHERS, in acknowledging the compliment, took occasion to refer to

the regretted absence through ill health of Mr. Harris. He spoke in high terms of the energy and heartiness with which that gentleman had thrown himself into this movement. Mr. Harris had acted throughout with the generous impulse of true friendship, and it must be a great source of grief to him that he could not be there to witness the presentation to his old and esteemed colleague. He was sure that all present would join in wishing Mr. Harris a speedy restoration to health and strength.

The CHAIRMAN, in proposing the health of Mr. Aird, said that gentleman was at the head of one of the largest and most respectable firms in London. He was intimately associated with gas-works, and might almost be called the father of contractors. The firm which Mr. Aird represented had on more than one occasion done good service to gas companies, and all must remember the valuable help they furnished during the last stokers strike.

Mr. AIRD responded, and said he was an old gas man. He had been connected with gas-works more than half a century, and had been engaged in them from the time he was a boy, in every department. As contractors for gas and water works it was a great satisfaction to him to know that his firm had been successful in securing the approval of the companies by whom they had been employed in all parts of the kingdom.

Mr. MANN said he was desirous of proposing a toast. Throughout the changes which had taken place, consequent upon the amalgamation of the City Gas Company by the Chartered, there had been a general good feeling exhibited towards him from the governor downwards; but there was one person with whom he had been thrown into most intimate relations, and with whom he had been able to work most satisfactorily. He referred to Mr. Johnson. He had been associated with that gentleman day after day at the same station, the one as superintendent and the other as chief inspector, and it would have been an easy thing to have had a quarrel continually, and to have been before the board once a fortnight; but he was bound to say that, as far as he was concerned, he never wished to work with a better officer than Mr. Johnson, and therefore he would propose his very good health, and his continued prosperity in connexion with The Gaslight and Coke Company.

Mr. JOHNSON, in returning thanks, said he did not expect so much honour would be done to him. He owed to Mr. Mann a debt of gratitude for the friendly and genial spirit which had pervaded their official intercourse, and which had enabled them to work together in a position where unpleasantness might have arisen. He had never, in all his business career, met with a better friend than Mr. Mann, or one whom he more highly esteemed. From the day he went to the Blackfriars station to the present time, nothing had occurred to cause a moment's heartburning, and he was proud to hear Mr. Mann speak of him as he had done.

The remainder of the evening was spent in agreeable intercourse.

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

The Second Annual General Meeting of this Association was held in the Town-Hall, Dumfries, on Friday, the 26th ult.—the President, (Mr. William Key) in the chair. There were 40 members present.

The PRESIDENT, in opening the proceedings, expressed his satisfaction in seeing so large a number of members present, especially considering the distance from which many of them came. He then alluded in feeling terms to the serious illness of the secretary, Mr. Black, and to the derangement in the plans for holding this meeting, which that illness occasioned. Mr. Black had just issued the circulars convening the meeting, and made applications for papers to be read, when he was attacked with small-pox, from which he was still suffering, with the added affliction that his wife and large family had been stricken down at the same time. He (the president) took occasion, in connexion with this event, to remark upon the advantage of the benevolent-fund recently established to meet cases of distress arising out of sudden and serious calamities of this nature. He was sure the members generally would sympathize deeply with the secretary, and that those members whose communications to the association had latterly remained unanswered, would find in the announcements he had made, the reason of the apparent neglect. He said the committee had deemed it prudent not to ask for any documents out of the secretary's possession, and resolved to call the meeting and open a general conversational discussion on topics of interest in gas-works. Under these circumstances, they had to thank Mr. Malam, of Dumfries, and Mr. Scott, of Musselburgh, for coming forward to their assistance to-day with communications, each explaining his own system of destructive distillation of coal in the manufacture of illuminating gas. Since last meeting the committee had issued the circulars appealing to persons interested in gas-works for aid to the "benevolent-fund." The expenses of 6000 circulars, envelopes, stamps, and advertising amounted to about £40; and the receipts in answer to this appeal amounted to £80. This result was not at all encouraging, and considering that the "fund" was not for the special good of any society or country, but for England or Ireland as much as Scotland, and members of the British or North British as much as the West of Scotland Association, it was to be hoped that the circulars sent out and laid aside would yet bear fruit.

In the absence of the minute-book, the report of the last meeting, given in the JOURNAL OF GAS LIGHTING, was read as far as the list of new members, and approved of.

The PRESIDENT made a few general remarks respecting subjects of interest to gas managers, apologizing for his inability through pressure of business to prepare anything in the shape of an opening address. He specially called the attention of members to the admirable and very practical address of Mr. Livesey in opening the last meeting of the British Association, and commended its careful perusal to every one of them for much useful information.

The following gentlemen, managers of the gas-works in the towns where they reside, were, on the motion of the PRESIDENT, seconded by Mr. J. HALL (Hexham), unanimously elected ordinary members:—

William Meikle	Longford, Ireland.
Edward Byrne	Portrush, "
William M'Donald	Kilsyth, North Britain.
Patrick O'Neill	Lockerbie, "
John P. Scott	Midcalder, "
William Young	Musselburgh, "
William Cook	Holytown, "
Archibald Nisbet	Galston. "

And the following gentlemen were unanimously admitted extraordinary members of the association:—

Andrew Stewart, Esq.	Glasgow.
Gavin Paul, Esq.	Wilsontown.
William Brodie, Esq.	Glasgow.
John Young, jun., Esq. . . .	Glasgow.

The PRESIDENT then remarked that with these new names, independently of any applications which might be in the hands of Mr. Black, the roll of the association stood at 127, showing that the society steadily prospered. As there were not many more than 200 gas managers in Scotland altogether, the society could not expect long to have an increase to their membership, as in the past, of 20 or 25 at each meeting; but it was evident that the same satisfactory feeling existed towards the society as before. With regard to the admission of extraordinary members, however, he had one proposal to bring forward in the name of the standing committee. There was a good proportion of these members in the association at the present time, and after explaining the reasons that had influenced the committee in this matter, he moved that the entrance-fee for extraordinary members after this meeting be raised to £5.

The motion was agreed to.

The PRESIDENT submitted another proposition, to the effect that two general meetings be held annually, in place of three, as at present; and stated that, although four meetings were provided for in the rules, only three meetings annually had been held. Some members were anxious to have more, which was very gratifying; but the committee, at its last meeting, in Milngavie, had agreed to recommend the reduced number, whereby even better attendance might be attained.

Mr. RICHMOND asked at what time these meetings were expected to take place.

The PRESIDENT: April and September might be suitable for all parties, but the months need not be the same every year, and it is not necessary that the meetings should be six months apart.

After some conversation on the point, it was resolved to hold two meetings annually, the last to be considered the annual meeting. The first meeting in 1875 to be held in March or April, as the committee may determine, and the second in the month of September.

The PRESIDENT called attention to another recommendation of the committee. When constituting the society, it was thought there might be about 30 members; but now that the roll exceeded that number by 100, it was advisable to elect additional office-bearers. The offices were well distributed, as they ought to be, and it was proper that as many become acquainted with the working of the society as possible by being members of committee. He therefore proposed that, in place of seven members constituting the working committee, twelve be elected. The present committee, in bringing forward the various schemes that rendered the society most useful to gas managers and of great importance, had been well supported, and the fact of their having issued fully 5000 circulars in less than a fortnight showed that the society was quite able to discharge its work, and was able to undertake even greater duties. In resigning the office of president, he had to thank the association for the honour he had had for the past two years of conducting their meetings. He was about to leave the West of Scotland for the West of England, but would still take the greatest interest in the society. Any work he had done, he did not consider it as done by himself, for he had had the help of all his friends, the members of committee; neither was any work done for himself, but for the common cause. Since the last meeting in March, three of the members were crossing into English territory; he knew of other three who had taken strides in their profession into better appointments, and two who had left for foreign parts and largely augmented incomes. He felt glad when he thought that there was something about this society which had been instrumental in bringing about these improved circumstances—something that set the members of lesser works seeking about for new knowledge, that drew them together in meetings for intercourse and exchange of opinions, that led all to improvement and befitted them for better undertakings, giving, at the same time, more individual confidence and ability, whereby they had been rendered abler gas managers. They had thus been successful in obtaining much better appointments; such, at least, was what the changes of the last few months amongst the members of this society seemed to indicate.

Mr. HALL (Hexham) proposed that the president be re-elected.

The PRESIDENT pointed out that it would be a conspicuous mistake for the West of Scotland to have a president in the West of England. Glasgow must always be considered as the centre of this association. He did not object to take office in some form, and to lend a hand in the work of the society, but, although grateful for the proposition, he could not, for the sake of the society, allow it ever to be put to the vote. He hoped, however, to have the same free correspondence with any member of the society on any topic that he had all along enjoyed.

Mr. W. Smith and Mr. W. Young were each proposed as president for the ensuing year; but both having declined, on the motion of Messrs. RENFREW and YOUNG, Mr. Abraham Malam, of Dumfries, was unanimously elected president for the year ending 1875.

Mr. MALAM thanked the meeting, and said that he was willing to do all he could in the interests of the society, and feared he might not be able to attend regularly if business interfered; whereupon

The PRESIDENT congratulated Mr. Malam on his election, and reminded him that there would always be a vice-president on the spot, should professional duties at any time detain him.

On the motion of Messrs. HALL and SWAN, Mr. W. Smith (Helensburgh) was re-elected vice-president for the ensuing year; and on the motion of Messrs. SWAN (Maryport) and KIRKLAND (New Cumnock), Mr. W. Key was elected honorary secretary. On the motion of Messrs. HALL and FULLERTON, Mr. Dunlop Hamilton was elected secretary; and Mr. John Learmont treasurer of the association. Messrs. D. Brown (Crieff) and J. M'Ewen (Gourock) were appointed auditors for the ensuing year, and the following members were elected members of committee:—

D. Jeffrey, Kirkintilloch.	S. Black, Alexandria.
M. Hunter, Rothesay.	W. Ewart, Annan.
W. Drummond, Coatbridge.	W. Young, Musselburgh.
D. Keith, Barrhead.	

It was agreed that the next meeting be held at Musselburgh, in September.

The PRESIDENT asked if there was any case to be recommended to the notice of the committee for aid from the benevolvent-fund.

Mr. FULLERTON reported that an ex-gas manager had, by an accident, while on duty, three years ago, received such injuries as to be rendered unfit for work, and was in a necessitous condition.

The PRESIDENT assured him the case would have the very earliest consideration by the committee.

Mr. ABRAHAM MALAM (Dumfries) read the following paper on

IMPROVED MODES OF CARBONIZING COAL IN THE PRODUCTION OF ILLUMINATING GAS.

It is not my intention, in speaking of my new method of carbonizing coal, to take much of your time to-day, rather preferring that an opportunity should be afforded the members of this association of proving satisfactorily for themselves the truth of these advantages, which I claim for my process over any other method whatever. In the papers which I had the pleasure of reading at the meetings of this society at Kirkintilloch and Hamilton, I endeavoured as clearly as possible to describe the apparatus, and explain the method of working; but it struck me that if the members of the association would consent to make Dumfries their next place of meeting, they would be enabled to see, and, as practical men, realize for themselves that I had not over-rated the value and importance of the process. That suggestion was kindly acted upon, and our meeting to-day is the result. I shall have much pleasure in affording every means of practically testing the process in actual operation.

Twelve months ago the directors of the Dumfries Gaslight Company requested me to erect new retort-benches, and to apply my improvements as patented, and I have the satisfaction of stating that the adoption of my plan had, in that short period of time, been the means of saving 986 tons of gas coal, independent of the saving effected in retorts and labour; but if we only take the value of the coal at the rate of 38s. 6d. per ton, the saving in twelve months represents a money value of £1898. And let it be remembered that fully more gas has been made than the previous year. The number of retorts in use when under the ordinary system of carbonizing was 22, which comprised both the Dumfries and Maxwelltown works. The completion of the new carbonizing apparatus at the Dumfries works now enables me to manufacture

with 14 retorts the whole quantity of gas required, and so doing away with the works in Maxwelltown, which have been disposed of. I need not point out the benefit of this, as you will readily understand how much more convenient such an arrangement must necessarily be. Having thus briefly called your attention to the economical working of my new system, permit me to invite you to accompany me, so soon as the other business will permit, to the gas-works, so that you may examine minutely the apparatus, and witness the drawing of the test-charge, which you had yourselves seen put in, and the station-meter will testify to the result. In conclusion, permit me to thank the association for its presence here to-day; and I am sure, if time will admit of the members inspecting some of her localities, no one will regret this present visit to the Queen of the South.

Mr. MALAM, in explaining his newly constructed and beautifully finished models which lay upon the table, wished to say little about them, since the actual works had been examined by the association. He mentioned the method of cooling the ascension-pipes by water on the outside, as distinguished from his own, in which the water trickles down within and prevents the deposit of earthy particles, which would so readily separate from his highly carbonized gas. Mr. Malam defied competition, and challenged any man in Europe. In answer to Mr. Keith, Mr. Malam stated that the charges seen in the retorts that morning had been kept in for five hours, but were usually drawn every three hours and a half, and that the doors had been all taken off to-day merely because of the visitors.

In answer to a question from Mr. John Swan (Maryport), Mr. MALAM gave the result of experiments on English coal. An engineer from London had found 13,500 cubic feet to be got from 1 ton by his process, and an engineer from Halifax 13,400, and that without deterioration.

Mr. YOUNG wished to inquire at what stage of Mr. Malam's process the improvement took place, for in the ordinary retort the distillation is complete, and the additional incandescent coke would tend to decompose the gas. He supposed that the improvement in the early part of the process must be great in order to make up for this loss.

Mr. MALAM: I have not made such careful or frequent experiments as I intend to do this year, but I may state that the maximum illuminating power is attained after two hours, being then up to 40 or 42 candles.

Mr. YOUNG was of opinion that a modification of Mr. Malam's process would work much better—if, for instance, there were two retorts, and the gas made by the improved process could be shut off from the coke which tends to decompose it.

Mr. MALAM pointed out that the employment of water would be necessary to prevent choking.

Mr. YOUNG: There are various ways of keeping the pipes clear; provided the decomposition is just sufficient to break up the carbonaceous matters without decomposing them.

Mr. MALAM: You clearly show that you cannot make the same quantity of gas as I. I can make pitch if you like, and still keep the pipes clear.

Mr. YOUNG: But the decomposed water will not increase the illuminating power.

Mr. MALAM: The facts are the opposite of what you expect according to your theory. I have a high illuminating power.

Mr. YOUNG: I confess that your experience in your method is better than theory; but it would really seem that I am right, if the people of Dumfries have only half light, unless an enlarged burner is employed.

Mr. MALAM: You are right, truly, if such is the case. But such is not the case.

Mr. WALKER at this point introduced an inquiry about the water used by Mr. Malam. Where, he asked, does it go to? For by letting such water run into any river, a manager might incur a fine of £200, so that no one could work the process.

Mr. MALAM: It is thrown up into a cistern, and it wastes in steam. I do not make ammonia, you must know; and I also send the water into the tanks.

Mr. WALKER: Oh, indeed! But what about the surplus; for if any of it ultimately found its way to a stream, you might suffer.

Mr. MALAM: It goes into the ashpits.

The PRESIDENT: The volume of the water does not increase in the process, I think Mr. Malam has stated.

Mr. MALAM: You are right. The volume does not increase, unless to a very small extent—say 1 per cent.

Mr. WALKER: The water then must be hot, going down the steam-pipes?

Mr. MALAM: Yes; it is.

Mr. NELSON: I think the difficulty that has been raised by Mr. Walker is very appropriate; but Mr. Malam is very well circumstanced in so much that he has no distance for the water to traverse, and be exposed to atmospheric and other influences. You must all have remarked how weak the water is which you saw. But as to Mr. Young, Mr. Malam is a little bashful, and does not boast that the people of Dumfries are highly pleased. I have been here on business of other sorts, and when it got wind that I had to do with gas, I was questioned by people, from the provost downwards, as to the merits and demerits of this process. But Mr. Malam, I am able to say, is much respected in this town. In one case where there was a poor light, I remarked, "Well, no one can call this good." We went to another place, and the gas was positively delightful. The fact was that the people had not thought of putting in a burner for the gas they were burning. I need not tell you that a burner must be adapted to the gas. Neglect of this may have given rise to some complaints. For my own satisfaction, and that of some connected with the town, I ascertained that the question is merely one of accommodation.

Mr. YOUNG: My reply only is that from 15-candle gas we get light equal to 30 by changing the burner. This is by doubling the quantity. Now, Mr. Nelson indicated that there had been complaints, and also that these are to be removed by altering the burner.

The PRESIDENT: Mr. Malam, can you settle the matter by telling us whether you have ever had complaints concerning the quality of your gas?

Mr. MALAM (with energy): Not one!

Mr. NELSON: It may be said that Tom will complain to Dick, and Dick to Harry, and yet no compiaints reach head-quarters; but I have much connexion in Dumfries, and there is nothing like a public grumble. The party I referred to had a burner perfectly corroded.

Mr. YOUNG: I have had experience in destructive distillation for various purposes, and I only wish to satisfy others and myself about this particular process.

Mr. MALAM: I shall be delighted to help you by giving you a month's lodgings with me in Dumfries.

Mr. YOUNG: I thank you, Mr. Malam; I must spend my summer holidays with you.

Mr. HALL: I would like Mr. Malam to give us more encouragement in adopting his process. It is not easy for small works to procure its advantages.

Mr. MALAM: One shilling per ton is not much for every ton carbonized. If 1s. for 3000 or 4000 feet is too much, I had better shut up. I am glad to say that there are four towns in Ireland and one in England about to adopt my process.

Mr. KEY: While we are here at the centre of Mr. Malam's operations, from which information must go to all the gas world, I hope that any question will be readily proposed, for our time is limited.

Mr. MRIKLE (Longford) asked whether Mr. Malam had greater condensation and leakage than in former years.

Mr. MALAM: The average is the same.

Mr. DUNCAN (Langholm) asked whether the Halifax gentleman was any relation of Mr. Malam's?

Mr. MALAM: Yes; but is the Dublin engineer?

The PRESIDENT: Our inspection of Mr. Malam's arrangements at the works was attended with much satisfaction. Everything is very clear, and there is an immunity from chokes. How much time is consumed on account of these, by workmen having to attend them? The remark has been made that from Newcastle coal can be obtained 13,400 or 13,500 cubic feet, which appears to me pretty extraordinary, 17-candle illuminating power being maintained. I have every confidence in the gentlemen who have examined the works here; and you will remember the fact that there is a saving in the past year of 1000 tons of coal, at 43s. 6d. per ton, in this small town of Dumfries. The leakage not being increased is, as I have mentioned at a previous time, quite in keeping with my own experiments with high heats two winters ago. Mr. Young has made some very appropriate remarks, and his conclusions would seem fair; but the facts stated do make us wonder, as to the efficiency of Mr. Malam's system. The facts that he has been able to sell Maxwelltown Gas-works, and, instead of 22, to employ 14 retorts and fewer men, speak for themselves. Houses in England, with 14-candle gas, are better lit up than in Scotland, and the lights are by no means blue. If we accommodated our burners to our gas, we might have as good light as in England, Ireland, or anywhere.

Mr. NELSON: I should be sorry if any mistaken idea should go forth concerning the gas supplied to this town. I am not aware if Mr. Malam's word is pledged as to whether there may be some small deterioration or not, neither do I say that it is the usual way to increase the quantity, and yet keep the illuminating power, but it is a fact that Mr. Malam has diminished the price 2s. 4d. per 1000 feet; therefore there is surely a wide margin for any loss, even if this were shown to exist.

Mr. MALAM: What does the distiller do with the tar from gas-works? In Dumfries we take that ourselves, make it into gas, and sell it.

Mr. YOUNG: Take tar, and distil it in the same way as you do, and you get not 28, but 14-candle gas.

Mr. MALAM here repeated his invitation to Mr. Young to stay with him a month, and

The PRESIDENT requested that the discussion on this paper might cease, a hearty vote of thanks being awarded to Mr. Malam.

Mr. A. WILSON wished to bring a question before the association. When new water is supplied to a wash vessel, that night the gas is two candles power less; and, even with a large purifier in small works, the gas is richer before than after new lime is supplied.

Mr. JEFFREY suggested that the atmospheric air needs to be blown off, but

Mr. WILSON was of opinion that there is some other cause.

Mr. SCOTT (Musselburgh) read his paper on

A NEW METHOD OF DISTILLING COAL.

The subject to which I have the honour of drawing your attention is a new method of distilling coal for the manufacture of illuminating gas. In order that I may the better explain to you the advantage of this method, permit me in the first place to make a few remarks on the changes which take place during the manufacture of gas by the destructive distillation of coal in the ordinary horizontal retort, where the charges of coal are subjected to various conditions, according to the different stages of the distillation.

In the first stage of distillation the fresh charge of coal is only acted on externally, or where it comes in contact with the highly heated retort. The internal portion of the charge being for some time little affected by the heat, the consequence is that a large amount of the volatile matter escapes decomposition, and instead of being converted into permanent gas, it escapes from the retort in the form of hydrocarbon vapours, and is condensed into tar.

In the second stage of the distillation, the external portion of the charge has parted with its volatile matter, and has acquired a high temperature; through this the volatile matter, along with the gases from the centre of the charge, have to pass, and are nearly converted into permanent gases. In the next stage of the distillation the whole charge has acquired a high temperature, and only the central portion of each individual piece of coal is parting with its volatile matter; but as this volatile matter is exposed repeatedly to the decomposing action of a very high temperature—first, in passing from the centre to the outside of each piece of coal; and second, to the whole surface of highly heated coke—the gases are hereby decarbonized, and the last of the distillation is therefore pure hydrogen. It is evident that this mode of treatment in distilling coal is defective, as in the first stage the volatile matter from the coal is underdistilled, or not sufficiently decomposed to be converted into permanent gas, and in the last stage it is the reverse way, the volatile matter being over distilled or decarbonized by the large surface of highly heated coke. The middle of the distillation is the only one in which the coal is properly acted on.

You are aware that many attempts have been made to overcome the defects mentioned by improved methods of distilling coal, whereby the gases and volatile matter from a fresh charge of coal was caused to pass through the coke of an exhausted charge in another retort before passing into the hydraulic main. This process, or a modification of the same, has been tried and patented many times, and has nearly as many times been abandoned; and if we for a moment consider the conditions of this mode of distilling, we will at once see its defects. In the first stage of the distillation, when the fresh charge of coal is giving off a large volume of volatile matter, which has not been sufficiently acted on to be made into permanent gas, the passing of the products through a second retort has a very beneficial effect, as the hydrocarbon vapours, by passing through the second retort, are decomposed and converted to a great extent into permanent gas. In the second or middle stage the charge of coal is sufficiently acted on in the first retort, and, therefore, in passing through the second, it is decarbonized, and, therefore, very much increased in bulk; it is, also, very much deteriorated in illuminating power, the very elements which would give light to the gas, such as olefiant gas and hydrocarbon vapour, being decomposed, depositing carbon, and appearing as marsh gas. In the last stage, any little illuminating gas which escaped decomposition in the first retort would be sure to be destroyed in the second; the gain, therefore, is not so great by this mode of distilling coal as would at first sight be expected, for although the volume of gas is very much increased by the complete decomposition of the volatile matter from the coal, the illuminating power is almost proportionately reduced in consequence of the decarbonization of the rich light-giving gases and vapours at high temperatures. It is evident, therefore, that, with the ordinary horizontal retort, when the charge is left at rest during the whole time of the destructive distillation, that it is impossible to get perfect results; and that, in order to do so, the charge of coal or other substance would require to be subjected to certain modified conditions according to the stages of distillation—or, in other words, the first stage of the distillation would require to be subjected to similar treatment to that already described, whereby the volatile matter from one retort is caused to pass through a second retort containing heated coke; the next, or middle stage, to conditions similar to that in ordinary horizontal retorts; and in the last, or third stage, the over distillation should be avoided as much as possible by removing the gases as soon as formed, or by protecting them by some other means from decarbonization.

And now I will try to explain to you how these essential conditions to the proper distillation of coal by this new method are to be obtained; and, to enable me the easier to do so, I will ask your attention to this rough sectional

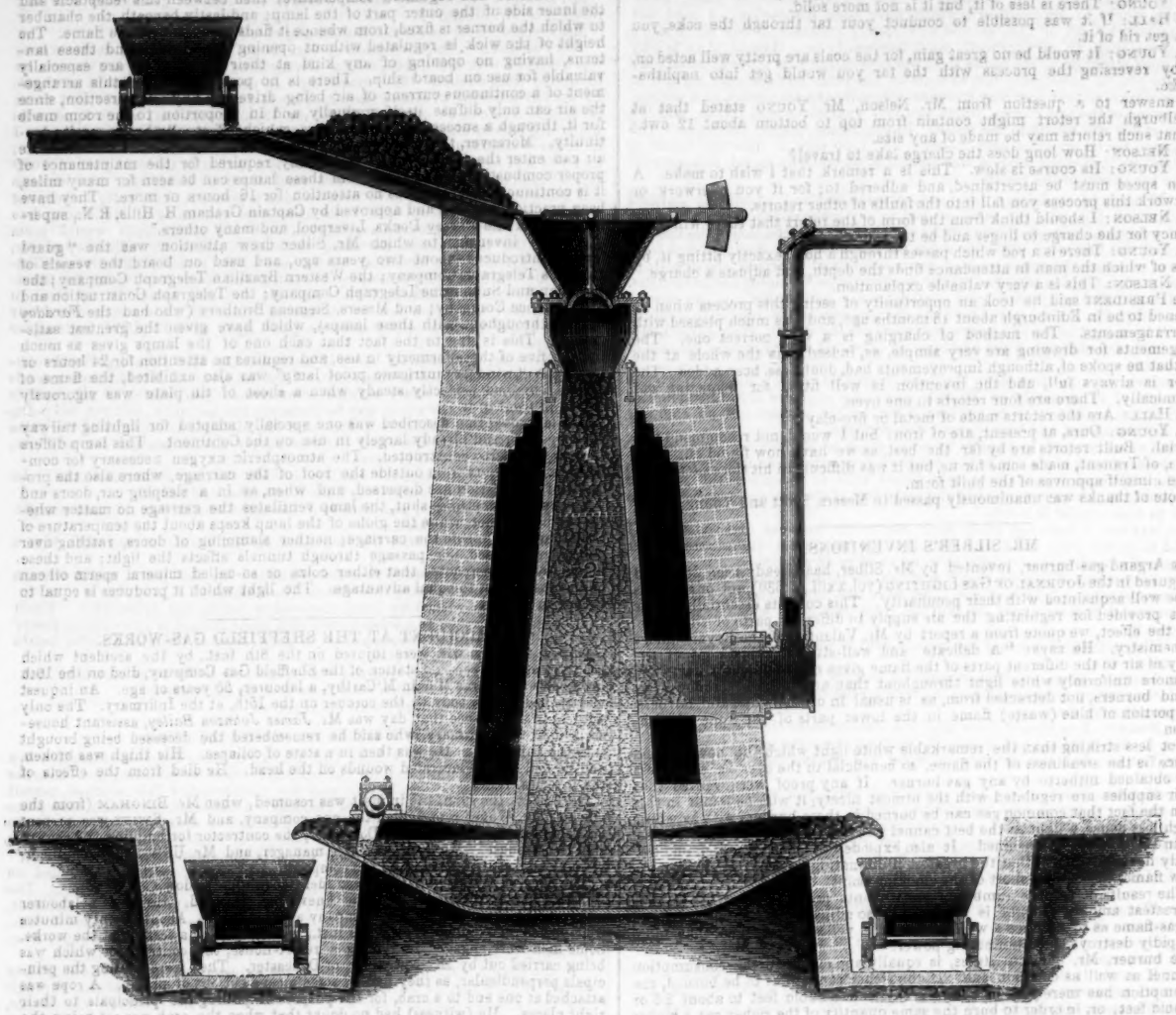


diagram of one of the new retorts. You will observe that the retort is set in a vertical position, and is conical, so that the charge of coal or other substances may pass freely through it. The bottom end of retort is set in a trough, which is filled with water, and acts as a seal to prevent the escape of gas, but allows the spent coal or coke to be easily withdrawn. The upper end of retort is supplied with a hopper and valve, to enable the charge to be quickly introduced, and prevent, as much as possible, the escape of gas. You will notice the outlet for gases is placed, not at the one end of retort, as usual, but considerably up the side of retort. The advantage of this position you will see when following the distillation of a charge of coal.

The furnace is not shown on the sketch, but is placed in the centre of the oven, with two or more retorts on each side. The working of the retorts is very simple. The coal is first brought to the scaffolding inclining to the hopper on top of retorts; the workman, in charging, has only to shovel forward sufficient coal into the hopper, and then depress the valve by placing his foot on the end of the lever; the coal immediately drops into the retort, and as soon as he removes his foot the counterpois weight, fixed on the end of the lever, brings the valve back into its place again, and perfectly closes the orifice. The drawing of the spent coke may be either done by manual labour with a rake or by steam power, as shown in the sketch. A rocking-shaft being fixed on the trough, having arms and connecting-rods to a stout bar of iron placed underneath the vertical retort, this bar being made to travel backwards and forwards pushes the coke into the waggons placed to receive it.

In describing the nature of the distillation, I will suppose the retort always to contain five separate charges or portions of coal undergoing treatment, which I will number 1, 2, 3, 4, 5, as shown on diagram. No. 1 is the portion of coal which has been last introdnced, and is undergoing a slow distillation, or similar to that for the production of paraffin oil. In the No. 2 portion the distillation is more active, or similar to the middle stage of distillation in the horizontal retorts; and the No. 3 portion is under the last stage of the distillation, and nearly exhausted of its volatile matter. The No. 4 portion is completely exhausted, and is in a highly heated state. No. 5 is the coke being gradually cooled as it comes in contact with the watery vapour from the water in trough. Now, as the outlet for the products of the distillation is placed opposite No. 3 charge, it is evident that the products from charge No. 1, in passing through charge No. 2, and again Nos. 1 and 2, must partially pass through No. 3 before escaping to the stand-pipes. The consequence is that the oil products from charge 1, in passing through charge 2, are partially decomposed and gasified, and the combined products of charges 1 and 2 are almost completely gasified in passing through charge 3, and that the gases from charge 3 are protected from decomposition by the large volume of comparatively cooler gases from charges 1 and 2 by the heat absorbed by the volatile hydrocarbons in being decomposed; at the same time the charge 5, in being cooled, produces so much steam or watery vapour, and this steam becomes superheated in passing up through a portion of charge 5, and in passing through the charge 4, of highly heated coke, is partially decomposed into hydrogen and carbonic oxide. This hydrogen, in turn, comes in contact with the rich gases in passing through No. 3 charge, and combines therewith, and assists in making the gases more permanent by suspending the hydrocarbon vapours. You will thus see that each of the charges is made to act and react on each other. As soon as charges 1, 2, and 3 become so far treated or exhausted of their volatile matter as to be in about the same condition as charges 2, 3, and 4, as much coke is drawn from the bottom of the retort as allows the whole to fall a stage; and in falling, owing to the conical shape of the retort, the whole mass of material inside of the retorts spreads out, and is in a degree broken up, and is exposed to a new heating surface. After drawing, a fresh charge is introduced at the top. This process is just repeated, drawing and charging alternately.

I have had four of this class of retorts at work for four months at the Musselburgh Gas-Works, and I am very well pleased with them, although, like every other new thing, we have discovered many wants. I would gladly give you the results of the past few months working, but as they have varied considerably from various modes of working, and also from want of proper construction in the building, I would prefer waiting until another time, when I hope to be able to give you the actual results of a longer period. At the same time, I may state that the results are much above ordinary horizontal retorts, both as to quantity and quality; and we trust to still further improve them by greater experience in working and improved construction of the building. And now, gentlemen, I have to thank you for your patience in listening to this rather roundabout way that I have described them. I will not say that I will make more gas than any other man, but I will say this, that any man, keeping a proper heat with them and charging them regularly, will make a larger quantity of gas and of a higher quality than I have ever seen made with horizontal retorts with the same quantity of coal.

The PRESIDENT: Mr. Scott has come forward to-day to oblige us and the committee, having been made acquainted with the circumstances in which we were placed. He has acquitted himself most ably; the diagram is well got up, the paper is explicit, and goes into the matter very fully. It is an important subject as affecting our profits, and I hope that some discussion will follow. Mr. Young is to make reply to any question, as having had some experience and connexion with Mr. Scott.

In reply to Mr. Kirkwood, Mr. YOUNG further explained the diagram, and remarked that the coal entered at intervals, but that it might practically be a continuous dropping as in lime-kilns, or in the manufacture of paraffin oil. The object is to subject the coal to such a temperature as to load the hydrogen with as much carbon as it can carry away, and at the same time not to destroy them. Stage No. 1 of the process is the same as that for paraffin oil. There was a patent taken out in London for making gas by a double distillation, and by this means the gas could both be enriched and increased in quantity. But the process, consisting of two parts, required double plant and double fuel. The object of the present invention is to employ the same process, but all in one. The gases of the last stage are protected from decomposition, and yet increased heat is attainable. The rocking-shaft and screw do away with labour too.

The PRESIDENT: How does the coal reach the hopper?

Mr. YOUNG: It has to be raised.

Mr. KEITH (Barrhead): What results can you mention?

Mr. YOUNG: Mr. Scott has had various results, some good, and others not so satisfactory, and he wishes not to supply the facts at present. By mere increase of heat, a large quantity of gas may be obtained, but poor, like Mr. Malam's.

Mr. MALAM: Mr. President, I deny the charge.

Mr. HALL: Is there much difference in the quality of the liquor?

Mr. YOUNG: The quality is much the same. The nitrogen is held tenaciously by the coke, unless water is present. There is a much larger quantity of liquor and of the ammonia per ton. Chokes may happen through negligence. By mere evaporation of the water from the pan, 3000 or 4000 feet per day are obtained. But we need more experience before giving actual details and statistics.

Mr. HALL: Is your tar thick or thin?

Mr. YOUNG: There is less of it, but it is not more solid.

Mr. HALL: If it was possible to conduct your tar through the coke, you might get rid of it.

Mr. YOUNG: It would be no great gain, for the coals are pretty well acted on, and by reversing the process with the tar you would get into naphthaline, &c.

In answer to a question from Mr. Nelson, Mr. YOUNG stated that at Musselburgh the retort might contain from top to bottom about 12 cwt.; but that such retorts may be made of any size.

Mr. NELSON: How long does the charge take to travel?

Mr. YOUNG: Its course is slow. This is a remark that I wish to make. A certain speed must be ascertained, and adhered to; for if you overwork or underwork this process you fall into the faults of other retorts.

Mr. NELSON: I should think from the form of the retort that there will be a tendency for the charge to linger and be too much heated.

Mr. YOUNG: There is a rod which passes through a hole, exactly fitting it, by means of which the man in attendance finds the depth, and adjusts a charge.

Mr. NELSON: This is a very valuable explanation.

The PRESIDENT said he took an opportunity of seeing this process when he happened to be in Edinburgh about 18 months ago, and was much pleased with the arrangements. The method of charging is a very correct one. The arrangements for drawing are very simple, as, indeed, was the whole at the time that he spoke of, although improvements had, doubtless, been added. The hopper is always full, and the invention is well fitted for managing gas economically. There are four retorts to one oven.

Mr. HALL: Are the retorts made of metal or fire-clay?

Mr. YOUNG: Ours, at present, are of iron; but I would not recommend this material. Built retorts are by far the best, as we have now found out. Mr. Grieve, of Tranent, made some for us, but it was difficult to hit the exact taper, and he himself approves of the built form.

A vote of thanks was unanimously passed to Messrs. Scott and Young.

MR. SILBER'S INVENTIONS.

The Argand gas-burner, invented by Mr. Silber, has already been described and figured in the JOURNAL OF GAS LIGHTING (vol. xxiii., p. 630), and our readers will be well acquainted with their peculiarity. This consists essentially in the means provided for regulating the air supply to different parts of the flame. As to the effect, we quote from a report by Mr. Valentin, of the Royal College of Chemistry. He says: "A delicate and well-studied adjustment of the supply of air to the different parts of the flame gives rise to a denser flame and to a more uniformly white light throughout than any hitherto produced by Argand burners, not detracted from, as is usual in ordinary Argand burners, by a portion of blue (waste) flame in the lower parts of the zone of combustion.

"Not less striking than the remarkable white light which the new burners produce is the steadiness of the flame, so beneficial to the eyes—a steadiness never obtained hitherto by any gas-burner. If any proof were wanted that the air supplies are regulated with the utmost nicety, it will be found in this and in the fact that common gas can be burned in these burners with as white, though less dense, a light as the best cannel gas, the difference being, of course, only in the quantities consumed. It also explodes the notion, which one frequently hears advanced, that the greatest illuminating power is produced by a yellow flame, just falling short of the smoking point.

"The results of a large number of experiments prove, without doubt, that the greatest amount of light is produced by so adjusting the supply of air to the gas-flame as to produce a white, and not a yellow, light; also, that more air rapidly destroys the illuminating power."

The burner, Mr. Valentin states, is equally applicable to the consumption of cannel as well as common gas. If the richer cannel has to be burned, the consumption has merely to be reduced, say from 5 cubic feet to about 3·5 or 3·8 cubic feet; or, in order to burn the same quantity of the richer gas, a higher chimney need only be substituted, and, *vice versâ*, for a poorer gas a somewhat lower chimney.

The results of photometrical testings are stated as follows:—"From the results of numerous photometrical testings extending over a number of days, and conducted under varying conditions, and with different qualities of gas, possessing an illuminating power of from 14 to 17 candles for common gas, and 21 to 22 for cannel gas, when tested according to the methods and with the best test-burners now in use in London, I can state with confidence that the new Argand gas-burners, made of porcelain or of metal with steatite tops, with 24, 32, or 40 holes, give an average illuminating power of from 20 to 22 candles for 5 cubic feet of common city gas when used with a cone, and from 18 to 20 candles when used without a cone. Cannel gas, producing by the ordinary test burners 21 to 22 candle light for every 5 cubic feet of gas consumed, gives the same amount of light for about 3·5 to 3·8 cubic feet of gas consumed in the new Argand gas-burners."

"Besides giving a greater illuminating power than any other Argand burner which has come under my notice, there are a few points of great practical importance which I would briefly refer to. The burners keep perfectly cool, although more metal enters into their construction than is probably the case in other burners. The conducting power of the metal for heat is entirely neutralized by the cold air which passes over the metallic surface. The chimney is kept cool in its lower parts, and can be taken off with the hand with the greatest ease at any time. The chimney keeps perfectly clean, even after having been in use for many days. The chimney is of the simplest construction and of the cheapest make. Its height (6½ to 7 inches) is such that a variation in the gas pressure does not materially disturb the combustion. The burners may, in fact, be said to have a range of fully 1 cubic foot—*i.e.*, a burner constructed to burn 5 cubic feet of gas will burn just as well 4½ or 5½ cubic feet of gas. The flame is perfectly steady, no flickering or dancing, so injurious to the eyes, with the least air draught. I believe I may venture to say that no other burner in existence has ever produced a similarly steady flame. It is, in fact, a thoroughly practical and serviceable burner."

The other inventions exhibited and described at the London Tavern meeting, to which we referred in our last, were, first of all, ship-lamps.

"Masthead, starboard, and port lamps, burning colza oil, without the aid of a glass chimney, giving a light more intense and pure than any hitherto obtained. The illuminating power of these is equal to about 26 candles, and a burner of the same size fitted to a moderator lamp, tested by Mr. Valentin, was found to consume only 49 grains of oil for each candle light, whilst an ordinary moderator lamp consumed from 65 to 66 grains of colza oil per hour for each single candle light given, so that a saving of about 33 per cent. is effected by using this burner.

Mr. Silber remarked: "The lamp receives its air supply from above, and neither movement nor atmospheric disturbance exerts much influence on the rate at which air descends through an aperture; this rate is mainly governed by that of the escape of the hot air, which has its outlet within the circle of ingress of the fresh supply; the cold air, on entering, is met a few inches below the aperture which gives it admission by a solid metal top or inner roof, which becomes heated when the lamp has been burning for a few minutes. A slit at one end of this inner roof allows the slightly warm and rarefied air to proceed onwards whenever it can find opportunity—that is to say, as rapidly as the exit of the exhausted or consumed air makes room for it. On its course it passes over the receptacle in which the supply of oil is stored, and keeps this at a moderate and regulated temperature; then between this receptacle and the inner side of the outer part of the lamp; and lastly beneath the chamber to which the burner is fixed, from whence it finds admission to the flame. The height of the wick is regulated without opening the lantern, and these lanterns, having no opening of any kind at their lower part, are especially valuable for use on board ship. There is no possibility under this arrangement of a continuous current of air being driven in any one direction, since the air can only diffuse itself gradually, and in proportion to the room made for it, through a succession of chambers, which effectually break up its continuity. Moreover, the capacity of the chamber is so calculated that no more air can enter the lantern than is actually required for the maintenance of proper combustion. The light from these lamps can be seen for many miles, it is continuous, and requires no attention for 16 hours or more. They have been practically tested and approved by Captain Graham H. Hills, R.N., superintendent of the Mersey Docks, Liverpool, and many others."

Another invention to which Mr. Silber drew attention was the "guard lamp," introduced about two years ago, and used on board the vessels of Hooper's Telegraph Company; the Western Brazilian Telegraph Company; the Brazilian and Submarine Telegraph Company; the Telegraph Construction and Maintenance Company; and Messrs. Siemens Brothers (who had the *Faraday* lighted throughout with these lamps), which have given the greatest satisfaction. This is due to the fact that each one of the lamps gives as much light as five of those formerly in use, and requires no attention for 24 hours or more. A "wind or hurricane proof lamp" was also exhibited, the flame of which remained perfectly steady when a sheet of tin plate was vigorously waved in front of it.

The last invention described was one specially adapted for lighting railway sleeping cars, and already largely in use on the Continent. This lamp differs from any hitherto constructed. The atmospheric oxygen necessary for combustion is supplied from outside the roof of the carriage, where also the products of combustion are dispersed, and when, as in a sleeping car, doors and windows are sometimes shut, the lamp ventilates the carriage no matter whether lighted or not, while the globe of the lamp keeps about the temperature of the atmosphere inside the carriage; neither slamming of doors, rattling over points, great speed, nor passage through tunnels affects the light; and these lamps are so constructed that either colza or so-called mineral sperm oil can be burnt in them to equal advantage. The light which it produces is equal to 15 sperm candles.

THE ACCIDENT AT THE SHEFFIELD GAS-WORKS.

One of the men who were injured on the 8th inst., by the accident which occurred at the Neepsend station of the Sheffield Gas Company, died on the 16th inst. His name was Martin M'Carthy, a labourer, 55 years of age. An inquest was opened on the body by the coroner on the 15th, at the Infirmary. The only witness in attendance that day was Mr. *James Johnson Bailey*, assistant house-surgeon at the Infirmary, who said he remembered the deceased being brought into the Infirmary. He was then in a state of collapse. His thigh was broken, and he had several lacerated wounds on the head. He died from the effects of the injuries.

On Friday, the 17th, the inquest was resumed, when Mr. BINGHAM (from the office of Mr. Wake) represented the gas company, and Mr. SWIFT was present on behalf of Mr. Nuscheler, of Doncaster, the contractor for building the roof of the retort-house. Mr. ROBERTS, the manager, and Mr. UNWIN, the engineer, were also present, representing the company.

The body of M'Carthy having been identified by his widow,

John Ward, bricklayer, said he knew the deceased. He was a labourer employed by the Sheffield Gas Company at Neepsend. About twenty minutes past eleven on Wednesday, the 8th inst., witness was on a scaffold at the works. Some men were engaged in roofing a retort-house, the contract for which was being carried out by Mr. Nuscheler, of Doncaster. They were pulling the principals perpendicular, as they had by some means got out of plumb. A rope was attached at one end to a crab, for the purpose of pulling the principals to their right places. He (witness) had no doubt that when the crab was set going the principals were pulled over the perpendicular on the other side, thus causing the whole weight of the principals to fall upon two guide-ropes, which were unable to bear the strain, and consequently broke. The result was that twelve principals fell to the ground with a crash. The deceased was working at the time, and was severely injured.

By Mr. SWIFT: The day before the accident the principals were supported by two props. They were there at the time the roof fell. He did not know that one of the props had been removed by the gas company's men and another substituted. He did not hear Mr. Nuscheler's men say that if one was removed it would be dangerous.

By Mr. BINGHAM: Witness had nothing to do with the props. They were put up by Mr. Nuscheler.

Thomas Lawless, bricklayer's labourer, said on the 8th inst. he was near the retort-house. Two men were winding at a crab, and two men aloft shouted "Hold on;" but they continued winding, and the roof came down. The deceased was taken from the *débris*, and removed to the Infirmary.

James M'Kane, labourer, said he was employed by Mr. Nuscheler at the gas-works when the accident occurred. He had been fastening some blocks to the principals for the purpose of bringing them to their proper place. Two or three days previously they had been put in perpendicular by props and guide-ropes. He believed that some of the bricklayers employed by the gas company had taken one prop down and slackened one guide-rope. He could not say what their object was in doing so. In witness's opinion the men at the crab did not pull the principal over the perpendicular.

By Mr. SWIFT: He believed the bricklayers had been told that it would be dangerous to remove the props. The men at the crab were working it carefully. He heard the foreman of the bricklayers say he must have the props out of the way, as they interfered with his work.

Some questions were then put, causing the coroner to remark that the inquiry was fast tending, not into one as to how the man was killed, but whether it was Mr. Nuscheler who was liable for all damage, or the gas company. It was for the jury to say if there was anybody to blame, but it did not matter to them who was liable for all the material, as there was a proper court for fighting out the question. The only thing that was quite clear was that the men of Mr. Nuscheler and the men of the gas company took two sides. It was clearly the intention of the bricklayers employed by the gas company to throw the blame on Mr. Nuscheler, and for the latter gentleman's workmen to impute blame to the company's men. It was clear that somebody deserved to be tried for perjury, but it was a difficult matter to make out who. It was as disgraceful evidence as he had ever taken, and it was only to be accounted for by there being two different sides, each wishing to clear his own party.

The room was then cleared for the jury to decide on their verdict. In a short time they returned a verdict, "That the deceased died from injuries received on the 8th of July, by a fall of iron roofing at the Neepsend Gas-Works," and added that in their opinion the evidence was unsatisfactory. At the same time they thought that what had happened might have occurred without anybody in particular being to blame in the matter.

REDUCTIONS IN THE PRICE OF GAS.—The York United Gaslight Company have given notice of an immediate reduction from 3s. 4d. to 3s. Prior to July last year the price was 2s. 6d. The Cupar Fife Company, at their meeting last week, reduced the price from 6s. 8d. to 5s. 10d. At Newmilns the price has been reduced from 5s. to 4s. 4d., and at Kirriemuir from 10s. to 9s. 2d.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The Thirteenth Annual General Meeting of the North British Association of Gas Managers was held on Tuesday last in the hall of the Andersonian University, Glasgow. Mr. WILLIAM FOULIS (Glasgow), president, occupied the chair, and there was a large attendance of members.

Mr. WM. MACKENZIE (Dunfermline), honorary secretary, read the minutes of last meeting, which were approved of.

Messrs. Samuel Dalziel (Kilmarnock) and Mr. Duncan Alexander (Edinburgh) were admitted as ordinary members; and Messrs. George E. Darling, Gavin Paul (Wilsontown), Brown (New Cumnock), and Robert Orr (Messrs. Miller and Co.) as extraordinary members.

The following gentlemen were elected office-bearers for the ensuing year:—President, Mr. G. R. Hislop (Paisley); vice-president, Mr. Samuel Stewart (Greenock); and Messrs. J. Hall (St. Andrew's), A. Malam (Dumfries), A. M'Pherson (Kirkcaldy), and Innes (Forfar) were appointed members of committee.

A hearty vote of thanks was given to Mr. Mackenzie for his past services, and he was unanimously elected again as secretary.

Mr. FRASER (Inverkeithing) submitted the financial report, which he said was very favourable. The income amounted last year to £38 7s. 7d., and after paying all expenses there was a balance left of 9s. 10d. The sum in bank is £51. The increase of the funds over last year is £21.

It was agreed to allow the secretary £5 5s. per year to meet incidental expenses. It was also agreed to allow travelling expenses to the committee for the ensuing year; and Mr. Fraser was reappointed auditor.

On the recommendation of this committee, the sum of £2 2s. was awarded Mr. Alexander, of Corstorphine, for a paper proving that shale can be used successfully in the manufacture of gas.

On the motion of Mr. WATSON (Edinburgh), a vote of thanks was awarded to Messrs. Hislop (Ayr) and Reid (Edinburgh) for essays on interesting subjects.

Dundee was fixed upon as the place of meeting for 1875, and the second Friday of July was selected as the date of meeting.

A full report of the proceedings, the president's address, and the papers read, will appear next week.

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in Marylebone during the month of June:—

	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon.in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·45	17·40	15·70	21·52	8·11	18·48	0·50	No trace
Chartered Company's common gas	16·61	17·46	15·79	32·96	13·30	12·46	0·53	No trace
Chartered Company's cannel gas	20·95	21·61	20·24	25·05	11·58	19·93	0·73	No trace

Mean of daily readings of barometer . . . . 29·92
" " " thermometer . . . 68·95

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas during the month was equal to the light of 16½ sperm candles; it ranged between 15·70 and 17·40 candles, showing that it was never less than 1·70 candles above the legal standard. The mean quantity of sulphur found in 100 cubic feet of this gas was 18·48 grains, and of ammonia half a grain. The mean light of the Chartered Company's common gas was equal to rather more than 16½ candles; it ranged between 15·79 and 17·46 candles; once only was it below the legal standard of 16 candles. The mean quantity of sulphur found in it was 12·46 grains, and of ammonia half a grain. The mean light of the cannel gas was equal to very nearly 21 candles; it ranged between 20·24 and 21·61 candles; thus it will be seen that this gas never fell below the legal standard, which is 20 candles. The mean quantity of sulphur found was 19·93 grains, and of ammonia about three-quarters of a grain. The pressure of all the gases was fair, and on no occasion was sulphuretted hydrogen detected by the ordinary tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone during the month of June:—

	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	June, 1873.	June, 1874.	June, 1873.	June, 1874.		
Distilled Water . . .	0°	0°	0°	0°	0°	0°
West Middlesex water .	18·68	18·66	0·84	0·72	13·1	2·04
Grand Junction water .	19·02	18·24	0·86	0·80	13·04	2·98

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

The water supplied to the parish by the West Middlesex Company during the month, was clear, bright, and well filtered, and contrasts favourably as regards purity with that supplied by the same company during the corresponding month of last year. The Grand Junction Water supply was slightly turbid, but the total solid matter contained in it was less than in June, 1873.

Major Bolton's report for the month of June states that the condition of the river at Hampton, Molesey, and Sunbury, where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was indifferent from the 1st to the 14th, when it improved, and became very good on the 22nd, in which condition it remained until the end of the month. The highest flood state of the river at Hampton during the month was 3 inches above the (6 feet) summer level, and the lowest 3 inches below. At Ditton the state of the water in the river during the month was good for 12 days, and indifferent for 18 days. The Chelsea Company is now the only one whose intake is below Hampton Court bridge. The highest state of the flood water at this place was 3 inches, and the lowest summer level. The highest temperature of the water during the month was 68°, and the lowest 59°, while the highest temperature of the air at the same place was 76°, and the lowest 55°. These observations were made daily at 9 a.m. The rainfall during the month was 2·27 inches. The water at the Thames intakes was generally good during the month. The West Middlesex Company is the only Thames company at present which, having large reservoir capacity, avoids taking in water during floods. The Lambeth Company are making large subsiding reservoirs at Molesey, and the construction of additional subsiding and impounding reservoirs by the Chelsea, Grand Junction, and Southwark and Vauxhall Companies is most desirable, so that when the river is in a turbid condition, the flood water may be allowed to pass.

IRON AND COAL TRADES OF SHEFFIELD, NORTH DERBYSHIRE, AND SOUTH YORKSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The iron trade of this district has been somewhat largely affected by the great strike of miners in the locality. The Parkgate works, and one or two others, have been almost wholly laid off, owing to the interruption of their fuel supplies, but there is now good reason for hoping that a speedy arrangement of the matters in dispute will be arrived at. That this is probable is evident from the fact that fully 9000 miners out of the 23,000 who originally struck have gone in again, and are at work, either at the reduction of 12½ per cent. or under a temporary arrangement, whereby both sides agree to abide by the general result of the struggle. It will thus be seen that under ordinary circumstances the colliery owners whose pits are idle are suffering much loss, to the great benefit and profit of those who are producing and selling coal in a but indifferently supplied market. It is apparent that this cannot last long, hence I anticipate that by the time this communication appears in type a settlement of the difficulty will have been arrived at, or at any rate will have been pertinently mooted. At Staveley matters are in much the same condition as heretofore, but I am glad to learn that the foundry is being carried on, partly, I believe, with fuel from the South Wales district. The other principal foundries in North Derbyshire, South Yorkshire, and the more immediate neighbourhood of Sheffield, as well as in that town itself, are still fairly, but not in all instances fully, employed on pipe and general foundry work.

THE NORTHERN COAL TRADE.

(FROM OUR OWN CORRESPONDENT.)

An important private meeting of the Durham coalowners was held in Newcastle-on-Tyne, on Friday, when it was understood that the question of another reduction of the miners wages was very fully debated, but further consideration of the subject was adjourned. The dulness in the coal trade, however, is very much confined to the South Durham pit district, which mainly rely upon local consumption for clearing off their output. The consumption is from 15,000 to 20,000 tons a week less than it was a few months ago; good screened manufacturing coals being about 11s. per ton, and nuts from 7s. to 8s. per ton. In the northern section of the Durham coal-field, however, a very active business is done. Last week more coals were shipped from the Tyne Dock than had been placed aboard ship for some weeks previously. A good deal of gas coal is being sent abroad to make up the stocks for the winter. The shipment of steam coals is kept up to a fair average from the Northumberland coal-field also.

There was a good arrival of vessels in the Tyne last week to load coals, and coasting freights receded a little. There was no great demand for tonnage to load coals for distant seas.

The chemical trade of the North is slowly recovering tone. The improvement in this trade may be considered as established.

The iron trade shows few symptoms of improvement.

A good deal of anxiety prevails in various parts of the North of England lest the water supply should not hold out throughout the summer. It is very low in most districts, and, as a rule, a system of short service has been established.

IMPROVED RAILWAY LAMP.—The gold medal of the Society of Arts, for twenty guineas, is offered for an improved lamp or means of illumination, suitable for railway passenger carriages, that shall produce a good, clear, steady, durable, and safe light. It must be simple in construction, and capable of being readily cleaned and repaired. In judging the merits, cost will be taken into consideration. Specimens in a condition suitable for trial to be sent in to the society's house, John Street, Adelphi, London, not later than the 1st of November, 1874. The council reserve to themselves the right of withholding the medal or premium offered, if, in the opinion of the judges, none of the articles sent in competition are deserving of reward.

DEWSBURY AND BATLEY CORPORATION GAS-WORKS.—In 1873 an Act of Parliament was passed, under the authority of which the two corporations named above became the purchasers of the gas-works belonging to the Dewsbury and Batley Gas Company for the sum of £266,875, a price which it was calculated would give the company 25 years purchase of their maximum dividends. The transfer was to take effect from June 30, 1873, and the gas company were to be paid their half year's interest to that date, and the two corporations entered upon possession, and continued to carry on the works jointly until June last, when the Batley Corporation took the works situated at Batley into their own hands as a separate undertaking. These works are the largest of the two. The Dewsbury Corporation have taken the works situate in their own district, which are incapable of making the quantity of gas required for the borough, and they will require to purchase gas from Batley for the next three years, at so much per 1000 cubic feet, which is to be determined by arbitration. A large station-meter has been erected on the boundary of the district, for the purpose of measuring the quantity so supplied. The Dewsbury Corporation are also building new and extensive works, which it is expected will be ready by the time their arrangement with the Batley Corporation terminates. To ascertain the proportion of purchase-money which each corporation should pay in respect of the works severally undertaken by them, it was determined to refer the matter to arbitrators. Mr. R. Dempster, of Elland, acted for the Dewsbury Corporation, and Mr. M. Sheard for Batley. The arbitrators commenced their task in March, and completed it on the 12th inst. Their award fixes the amount to be paid by Batley at £139,067 13s. 9d., and by Dewsbury at £127,807 6s. 3d.

Register of New Patents.

3291.—SILBER, A. M., Whitecross Street, and FARQUHAR, J. F. C., of Long Acre, London, "*Improvements in the construction of lamps and lanterns or similar apparatus used for lighting purposes, and an apparatus for heating purposes.*" Provisional protection only obtained. Dated Oct. 10, 1873.

According to this invention burners are formed with air passages or air chambers so contrived that all the draught of air drawn in by the combustion, and employed to maintain it, passes through them, and thence into a cone, cap, or chamber, or other air-tubes surrounding the flame, so that it impinges on the flame, and the aeriform products ascend direct to the top of the lamp, and escape without circulating around the flame, and the currents of air drawn in do not circulate around the flame. Thus a chimney is dispensed with. The burners may be applied for heating.

3305.—BAMBER, W., Openshaw, near Manchester, "*An improved gas-burner to be employed for gassing yarn.*" Provisional protection only obtained. Dated Oct. 11, 1873.

The invention consists of a cylindrical tube, made in two pieces screwed together, so as to admit of easy access for cleaning, having slots or orifices at the bottom to admit air, and perforated at the top. To the bottom of this tube is affixed a small tube, which screws into the main gas-pipe, and inside this, at the top, is screwed or fixed a smaller tube projecting up through the bottom of the burner. This tube is closed at the top and slotted or perforated at the sides, so as to allow the gas to escape, but to prevent the burned fibres or other impurities from falling into and blocking up the gas-passage, as any burned fibres or dust that may fall in through the top perforations will fall out again at the openings in the bottom, and thus the burner is self-clearing.

3308.—Newton, H. E, Chancery Lane, London, "*An improved mode of connecting gas, water, or other pipes.*" A communication.. Patent dated Oct. 11, 1873.

The object of this invention is to obviate the necessity for using pipes with socket ends for ensuring tight joints, and to permit of the use of pipes made with a uniform barrel throughout, which will allow of any desired length being cut off and coupled up to complete a run of pipe.

In carrying out the invention a series of annular grooves or hollows is formed round the ends of the lengths required to be joined. These grooved ends are introduced into a leaden sleeve of double conical form externally, and having at the middle of its length an internal annular rib which forms an abutment for the ends of the pipes to be coupled. The joint is completed by forcing over the opposite ends of the leaden sleeve conical clamping rings, which, when driven home by means of a hammer or cramp, will compress the lead into the annular grooves or hollows on the ends of the pipes. By this means not only a strong and perfectly water and air tight joint will be obtained, but owing to the compressibility of the internal annular leaden rib, space for the expansion of the metal pipes will be given.

3314.—Manwell, J., Glasgow, "*Improvements in charging horizontal retorts, and in apparatus therefor.*" Patent dated Oct. 13, 1873.

This invention has for its object the charging of retorts in a rapid, effective, and simple manner, and consists principally in imparting a sufficient momentum to the entire charge on bringing it up to the mouth of the retort in a scoop or holder, so that when the scoop or holder is arrested at the mouth of the retort the charge is thrown into the retort. With such an action it is in practice found that the charge becomes deposited in the retort in a suitable manner.

In one arrangement of apparatus the scoop or charge-holder is mounted on wheels, and an inclined railway is provided for running it down towards the retort mouth so that it may acquire the necessary momentum. In a second arrangement the scoop or charge-holder is suspended by sling rods or chains so that it can swing pendulously towards the retort; whilst in a third arrangement the scoop or charge-holder supported on horizontal rails or guides is propelled towards the retort by a piston acted on by steam, compressed air, water, or other fluid under pressure. The rails, guides, or other supports for the scoop or charge-holder may be upon a wheeled carriage or frame capable of being moved along in front of a bench of retorts, so that the apparatus may be brought opposite each as required.

3318.—Muir, J. S., Leeds, "*Improvements in manufacture of petroleum oils and spirits and like hydrocarbons for the manufacture of gas therefrom.*" Provisional protection only obtained. Dated Oct. 14, 1873.

This invention has for its object the refining of petroleum by means of bichloride of tin.

3319.—Muir, J. S., Leeds, "*Improvements in the manufacture of gas.*" Provisional protection only obtained. Dated Oct. 14, 1873.

This invention consists in charging atmospheric air with hydrocarbon from petroleum.

APPLICATIONS FOR LETTERS PATENT.

2371.—Walker, W., Newton Moor, Chester, "Improvements in direct-acting steam pumping-engines." July 7, 1874.

2374.—Forbes, Rev. G. H., Broughton, Northampton, "Improvements in the manufacture of cements." July 7, 1874.

2380.—Bean, E. E., Boston, U.S.A., "A pneumatic electric gas-lighting apparatus." July 7, 1874.

2397.—Wilson, H., Stockton-on-Tees, and Steel, J., Glasgow, "Improvements in apparatus for cooling and heating liquids and gases." July 8, 1874.

2404.—Cooper, H. E., Bethnal Green Road, London, "Improvements in the means of and in apparatus for carburetting air or gas for illuminating or heating purposes." July 8, 1874.

2408.—Hallsworth, S., Armley, near Leeds, and Bailes, E., Woodhouse Carr, Leeds, "Improved means or method of treating and clarifying sewage or other impure waters." July 9, 1874.

2428.—Mackenzie, T., Wednesbury, "Improvements in steam pumping machinery." July 10, 1874.

2431.—Whitton, C., Leslie, N.B., "Improvements in stop-valves for pipes." July 11, 1874.

2434.—Warren, S. H., Crew, and Wates, P. J., Greenwich, "Improvements in machinery and apparatus for charging and drawing retorts." July 11, 1874.

2439.—Schmersahl, A. E., Manchester, "Improvements in treating sewage water and other foul liquids for the purpose of purification, and in the manufacture of manure." July 11, 1874.

2446.—Lyttle, W. A., Hammersmith, Middlesex, "An improved process for treating sewage, and for utilizing certain products derived therefrom." July 13, 1874.

2450.—Scott, H. Y. D., Ealing, Middlesex, "Improvements in the recovery of carbonate of ammonia from sewage." July 13, 1874.

GRANTS OF PROVISIONAL PROTECTION.

2220.—Tackels, C. J., Brussels, "Improvements in gas-burners." June 26, 1874.

2243.—Bischof, G., Andersonian University, Glasgow, "Improvements in the construction of filters, and in the preparation of materials used for the purification of water." June 29, 1874.

2245.—Morgan, O. V., Kensington, Middlesex, and Moelchaerek, G. R., Battersea, Surrey, "Improvements in stoneware filters and coolers for filtering and cooling water." June 29, 1874.

2270.—Clark, A. M., Chancery Lane, London, "Improvements in the manufacture of gas and fuel." A communication. June 30, 1874.

2274.—Connell, W., Glasgow, "Improvements in valves for water-supplying apparatus." July 1, 1874.

INVENTION PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATION.

2380.—Bean, E. E., Boston, U.S.A., "A pneumatic electric gas-lighting apparatus." July 7, 1874.

NOTICES TO PROCEED.

768.—Landau, M. I., St. Mary Axe, London, "Improvements in lamps, also in burners and in apparatus for supplying and regulating gas." March 3, 1874.

813.—Goold, G., Birmingham, "Improvements in cocks or valves for regulating the flow of liquids." March 5, 1874.

934.—Hills, F. C., Deptford, Kent, "Improvements in the purification of gas and gas liquor." March 14, 1874.

935.—Holland, H., Birmingham, "New or improved apparatus for charging atmospheric air with the vapour of hydrocarbon liquid." March 14, 1874.

939.—Teulon, G. A., Hampstead, Middlesex, "Improvements in cylinder engines and pumps." March 16, 1874.

1052.—Jensen, P., Chancery Lane, London, "Improvements in the manufacture of gas and apparatus therefor." A communication. March 25, 1874.

1066.—Keith, J., Arbroath, N.B., "Improvements in the manufacture of illuminating gas and in the apparatus employed therefor." March 27, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

25.—Gottheil, R., Berlin, "Improvements in motors to be worked by gas." A communication. Jan. 2, 1874.

77.—Fottrell, J., Dublin, "Improvements in artificial stone pipes and tubes, and in the coating or lining thereof, to render them suitable for the conduit of alkaline liquids and acid products from chemical, manure, and gas works, for sewage, saline liquids, and gas." Jan. 7, 1874.

84.—Brookes, W. H., Birkenhead, "Improvements in pumps." Jan. 7, 1874.

128.—Woodward, J., Darlington, "Improvements applicable for the manufacture of pipes and tiles for sewage and draining." Jan. 9, 1874.

138.—Jensen, P., Chancery Lane, London, "New or improved modes of and means and materials for the manufacture of gasholders and other vessels." A communication. Jan. 10, 1874.

195.—Teale, W. E., Manchester, "Certain improvements in lamps." Jan. 15, 1874.

206.—Ball, C. J., New Bridge Street, London, "Improvements in the manufacture of drills for boring holes." Jan. 16, 1874.

219.—Griffin, J. T., Upper Thames Street, "Improvements in the construction of wrenches for turning pipes and other similar articles." A communication. Jan. 16, 1874.

231.—Forbes, Rev. G. H., Broughton, Northampton, "Improvements in the purification of gas and the manufacture of artificial fuel." Jan. 17, 1874.

239.—Broadfoot, J., Glasgow, "Improvements in pumps." Jan. 19, 1874.

242.—Gedge, W. E., Strand, London, "Improvements in gas-burners with lateral and covered jets." A communication. Jan. 19, 1874.

254.—Synge, M. H., Pall Mall, London, "Improved apparatus for deodorizing and discharging fluids, and for trapping sinks, drain-pipes, and tanks." Jan. 20, 1874.

255.—Synge, M. H., Pall Mall, London, "Improved apparatus for filtering and purifying the drainage of houses and streets." Jan. 20, 1874.

283.—Scott, H. Y. D., Ealing, Middlesex, and Spence, J. B., Manchester, "Improvements in the treatment of sewage and ammoniacal liquids." Jan. 22, 1874.

Notes and Queries.

E. S. C.—I should like to know the respective weights of any given quantity of ammoniacal liquor from, say, 5 or 6 ounce strength upwards. Perhaps some of your readers who sell their liquor by weight, and according to its strength, will kindly favour me with this information.

Foul Lime as Luting.—Mr. De Mill, secretary of the Detroit, Mich., U.S., Gaslight Company, writes: "Please inform your correspondents that I commenced the use of refuse lime as a luting for retort-lids in 1851, and continued its use for 20 years."

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

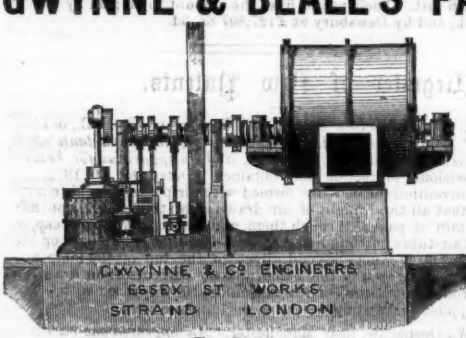


Fig. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

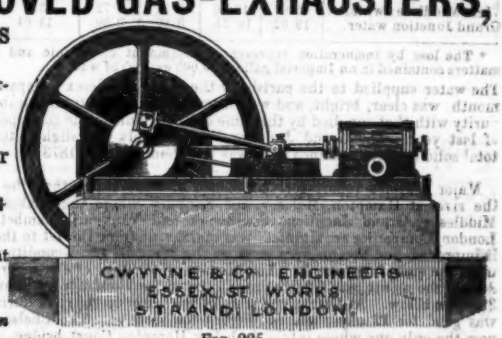


Fig. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. Gwynne and Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 800 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES, CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

WANTED, an active Fitter, accustomed to erecting apparatus, main-laying, and country Gas-Works. Fair wages.

Apply to W. Bunce, Foreman, Raven's Lane, Great Berkhampstead.

WANTED, a deputy Working Foreman, for retort-house. Must be sober and active. Wages 38s. per week. A considerable portion of Sunday allowed. State age, experience, and present employment.

W. J. Warner, Engineer.

Gas-Works, South Shields, July 11, 1874.

WANTED, an engagement as Manager or MANAGER and SECRETARY of a medium sized Gas-Work. Thoroughly understands the manufacture and distribution of gas, having had many years experience, and can give most excellent testimonials as to character and ability.

Address Manager, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, by a Gentleman, aged 27, a situation as MANAGER, on the Continent or abroad. Advertiser has been four years in present situation, where the make is above 90,000,000 feet per annum. Understands the manufacture and distribution of gas in all its branches. Speaks French and Italian. Leaving present situation on account of salary being insufficient.

Address Science, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a situation in a provincial Gas Company as GENERAL SUPERINTENDENT of Mains, Services, Meters, and Gas-Fittings. Can estimate for work to any amount. Thoroughly understands the requirements of a Gas Company in all its details. Good references from present and former situations.

Address E. G. J., care of Mr. Coleman, 300, Strand, London.

WANTED, by the Advertiser, aged 29, an engagement as MANAGER, Assistant Engineer, or Superintendent of a Gas-Work. Thoroughly understands the manufacture and distribution of gas, having had 13 years experience in designing, erecting, and managing. Fair draughtsman. Has a knowledge of accounts and of chemistry. Can analyze gas, &c., and use the photometer. Can produce testimonials or give references

Address E. A., 18, Cawley Road, South Hackney, E.

VINCENT'S
PATENT IMPROVEMENTS
IN
Apparatus for Manufacturing Gas.

Particulars to be obtained by application to—

Mr. LAYARD JONES,
Engineer,
25, OLD BROAD STREET, LONDON, E.C.

ADVANTAGES OF GAS FOR COOKING AND HEATING,

BY

MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas consumers.

Specimen Copy by post 4d., direct from Magnus Ohren, Gas-Works Lower Sydenham, London, S.E.

GAS MANAGER WANTED.

THE Directors of the Lurgan Gaslight Company will, at their meeting to be held here on Monday, the 27th inst., at Eleven o'clock a.m., proceed to elect a MANAGER for the works. Salary £120 per annum. Free house and fuel.

Applications and testimonials to be lodged with me not later than Saturday, the 25th inst.

Candidates to be in attendance on the day of election.

By order,
William Baird, Secretary.

Lurgan Gas-Works, July 6, 1874.

TO GAS ENGINEERS.

THE Directors of the Sheffield United Gaslight Company require the entire services of a RESIDENT ENGINEER.

The requisite qualifications are a thorough practical knowledge of Engineering, preparation of plans and construction of works, the manufacture and distribution of gas, and of chemistry as applied to its manufacture and purification.

Applications to be sent in not later than Tuesday, the 28th inst., addressed to the Chairman of the Company, stating qualifications, age, salary required, references, &c. Testimonials in the first instance are not necessary.

SLIDE-VALVES.

FOR SALE—14 12-in. and 5 10-in. Slide- VALVES with outside racks. They have been thoroughly re-fitted, and are equal to new. A low price will be accepted to effect a clearance.

Apply to James Watson, Engineer and Manager, Crystal Palace District Gas Company, Lower Sydenham, S.E.

A Ten-feet Gasholder, second hand, to be sold cheap, in good condition, well made, balanced on friction-wheels, and with compensating curve. Suitable for testing meters or for experimental purposes in a Gas-Work.

For price, &c., address A. Z., care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TO GAS MAKERS.

THE Bishop's Castle Gaslight and Coke Company, Limited, are prepared to receive TENDERS from GAS MAKERS, who must be competent to make gas, attend to the fittings, and devote the whole time to the service of the Company. He will be provided with a house, rent free, coals, and light.

Tenders to be sent in, with testimonials, to the Secretary, on or before the 1st of August next, stating salary. Population under 2000.

Thos. Griffiths, Secretary to the Company.

Bishop's Castle, July 17, 1874.

IMPERIAL GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at No. 33, John Street, Bedford Row, London, on FRIDAY, the 7th day of August next, at One o'clock precisely; and NOTICE is also hereby given that, in addition to the ordinary business transacted at such meeting, a resolution will be submitted authorizing the Directors to borrow on mortgage or bond, under the powers conferred by the Imperial Gas Act, 1869, an amount not exceeding £81,250.

The Transfer Books of the said Company will be closed between Monday, the 27th inst., and Friday, the 7th of August next, inclusive.

By order, Harry Chubb, Secretary.

Offices of the Company, Nos. 33 and 34, John Street, Bedford Row, London, July 14, 1874.

TO GAS COMPANIES.

A Quantity of Bright Derbyshire Gas COAL, of excellent quality, having been carefully tested in practical working, FOR SALE.

For quotations, address Mr. W. A. Plumbe, Mansfield.

CANNEL.

THE West Yorkshire Iron and Coal Company, Limited, will be glad to receive FORMS for TENDERS from Gas Companies and others requiring a supply of CANNEL.

Address, 72, Wellington Street, Leeds.

TENDERS FOR GAS COAL.

THE Directors of the Glossop Gas Com- pany are prepared to receive TENDERS for CANNEL and COAL.

Particulars may be obtained on application to the undersigned, to whom tenders must be sent in on or before Saturday, the 25th inst.

David Clarke, Manager.

Gas-Works, Glossop, July 17, 1874.

ST. JOHN, PORTO RICO.

CONTRACT FOR GAS.

TENDERS will be received at St. John, Porto Rico, on the 1st of October next, for supplying, during 15 years, the public lights of the said city, now consisting of about 340 lamps.

The Gas-Works, together with the Gasometers, of a total capacity of 37,695 cubic feet, and all their appurtenances and buildings, &c., will be handed over, under inventory, to the contractor, who will also have to provide gas to private dwellings at conventional prices.

Full particulars respecting the service can be obtained by personal application at this Office, where the conditions are on exhibit.

J. M. De Satrustegui, Consul-General for Spain.

21, Billiter Street, E.C., London, July 16, 1874.

DARTFORD GAS COMPANY.

TENDERS FOR COALS.

THE Directors of the Dartford Gas Com- pany invite TENDERS for the supply of Ravensworth Pelaw, Pelaw Main, New Pelton, or West Leverson COALS, delivered at their works at Dartford, Kent. Separate tenders should be furnished to the Secretary of the Company, on or before the 25th of July inst., giving price per ton for a supply for six or twelve months (as may be decided by the Directors) from the 1st of August next.

The total quantity required for six months will be about 900 tons, and for twelve months about 1800 tons, and they must be delivered as and when required by the Directors.

The Directors do not bind themselves to accept the lowest or any other tender.

Any further information can be obtained on application to Mr. J. C. Hayward, Secretary, Dartford, Kent.

TENDERS FOR COALS.

SPECIFICATION.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 28,000 tons of SOFT COALS and SOFT COBBLES or NUTS, to be divided into four contracts, of 7000 tons each; and to be delivered in the following monthly quantities, viz.:—

1874	August	400
	September	800
	October	900
	November	1000
	December	1000
1875	January	800
	February	600
	March	400
	April	300
	May	300
	June	300
	July	200
	Total of each contract	7000

The Company will undertake to receive from the party or parties contracting the total quantity of 28,000 tons, in one, two, three, or four contracts, as the Board may decide; but they do not bind themselves to accept the lowest or other tender or tenders, until after a satisfactory trial of the Coals and Cobbles or Nuts to which such tender or tenders may relate shall have been made. They are to be the best of their kind, and as free as possible from sulphur, bats, bind, refuse, and dirt, and shall be weighed upon a correctly adjusted machine.

Payments will be made monthly, if and so long as the contracts shall be duly fulfilled, to the extent of nine-tenths of the amount of the invoices, and the balance will be discharged on the satisfactory completion of the contract.

Sealed tenders (to be made on forms obtainable at the Company's Office), specifying the description of Coals and the pits at which they are to be raised, and stating the prices for delivery by canal at Derby at the new Gas-Works, adjoining the Midland Railway Company's workshops, or at the canal wharf, and also the price delivered at either of the Midland Railway Stations, Derby, and in manner and subject to the conditions aforesaid, must be delivered at the Offices of the Company, Friar Gate, on or before Saturday, the 1st day of August next.

The respective contracting parties will be required to execute an agreement to be prepared by, and to the satisfaction of, the Secretary of the Company.

By order of the Directors,
Isaac Fisher, Secretary.

Derby Gas Office, July 15, 1874.

WINDSOR ROYAL GASLIGHT COMPANY.

THE Directors of this Company invite TENDERS for the supply of 3150 Tons of GAS COAL (Unscreened), to be delivered free at the Windsor station of the Great Western Railway, such Coals to be either of the following descriptions—viz., New Pelton, Wearmouth, Holmside, Burnhope, Pelaw Main, or Ravensworth Pelaw.

The Contractor to state for which Coals he tenders, as none others than those specified in the tender will be received.

The Coals to be delivered as follows—viz., 450 tons per month, September, 1874, to March, 1875, both inclusive.

The Company undertake unloading of the trucks.

Tenders to be forwarded to me, marked "Tender for Coals," on or before the 1st day of August next.

The Directors will not entertain any conditional tender, or be bound to accept the lowest or any tender.

Geo. Cartland, Secretary.

Gas-Works, Windsor.

TENDERS FOR GAS COAL.

THE Walsall Improvement Commis- sioners invite TENDERS for the supply of 12,000 tons of Staveley, Yorkshire, or any other good GAS COAL, which may be delivered either at Walsall Railway Station, or by boat at Walsall Gas-Works; in the latter case it will also have to be unloaded and stacked in the coal-shed or such other place at the Gas-Works as may be directed. The Coal will have to be delivered at the rate of from 150 to 400 tons per week, as the Commissioners may from time to time require.

The weight, if delivered by rail, must be 2352 lbs. to the ton, if by boat it must be 22 cwt. to the ton, boat gauge. Payments monthly.

The Commissioners do not bind themselves to accept any tender, and they reserve the right to divide the contract between several firms.

Tenders, sealed and marked outside "Tender for Gas Coal," and stating the price for large Coal and also for Nuts, are to be sent to the undersigned on or before Thursday, the 30th inst.

Samuel Wilkinson, Commissioners Clerk.

Bridge Street, Walsall, July 6, 1874.

TO PIPE LAYERS AND OTHERS.

THE Aberdare and Aberaman Consumers Gas Company, are prepared to receive TENDERS for taking up and relaying several miles of MAIN-PIPES, 8 in. to 2 in. diameter, and also for laying new pipes.

The specification may be seen, and forms of tender obtained, on application to me at the Office of the Company in Aberdare, or to the Engineer, Mr. G. W. Stevenson, 19, Great George Street, Westminster, and tenders must be delivered to me on or before the 31st of July inst.

The Directors do not bind themselves to accept the lowest or any tender. By order,

Evan Jones, Manager and Secretary.

Aberdare, July 20, 1874.

GAS TAR AND AMMONIA WATER.

THE Chorley Commissioners invite TENDERS for the GAS TAR and AMMONIA WATER made at the Chorley Gas-Works, for One, Two, or Three years, which will be delivered at the works.

Further particulars may be obtained on application to Mr. Thomas Hamer, Manager.

Tenders, endorsed "Tender for Gas Tar, &c.," will be received by the undersigned up to Saturday, Aug. 1.

The Commissioners will not be bound to accept the highest or any tender. By order,

Richard Jackson, Solicitor,
Clerk to the Chorley Commissioners.

Chorley, June 26, 1874.

NEWPORT (MON.) GAS COMPANY.

TO CONTRACTORS AND BRICKLAYERS.

THE Directors of the above Company are prepared to receive TENDERS for the construction of a brick GASHOLDER-TANK, at their Gas-Works, Newport, Monmouthshire.

The Tank is to be 100 ft. in diameter, and 25 ft. 6 in. deep, inside measure, when completed.

Plans and specifications may be seen upon application to Mr. Henry Bowen, Engineer, Cardiff, or to the Manager, at the Company's Offices, Newport.

Sealed tenders, addressed to the Chairman of the Directors, and endorsed "Tender for Brick Tank," to be sent in on or before the 8th of August next.

The Directors do not bind themselves to accept the lowest or any tender.

Gas-Works, Newport, Mon., July 13, 1874.

THE PATENT LONDON ARGAND BURNER.

I have been informed that certain persons have been infringing my Patent for Gas Burners, and that other persons have been offering imitations of the same for sale. This is to give notice, that I shall PROCEED against all persons making or selling such imitations.

(Signed) William Sugg, Gas Engineer.

Vincent Works, Vincent Street, Westminster, July 15, 1874.

TO GAS COMPANIES, ENGINEERS, MANAGERS, &c.

DESIGNS & PLANS of GAS-WORKS,
EXTENSIONS AND ALTERATIONS,
DRAWINGS AND TRACINGS OF GASHOLDERS,
TANKS, RETORTS, RETORT-HOUSE FITTINGS,
ROOFS, GIRDERS, CONDENSERS,
SCRUBBERS, ENGINES, BOILERS, EXHAUSTERS,
PURIFIERS, GOVERNORS, VALVES, &c.,
Prepared with despatch, and at a moderate rate.

HILL AND CO.,
23, Southampton Buildings, Chancery Lane, W.C.

J. & H. ROBUS,

(Late of the Crystal Palace District Gas-Works, Sydenham, and the New City Gas-Works, Montreal, Canada,)

GENERAL CONTRACTORS & RETORT-SETTERS,
FITTERS & MAIN-LAYERS.

RETORTS SET ON THE LATEST IMPROVED PLAN.

Retort-Setters sent to all parts of Europe and America.

Address, J. and H. ROBUS,
BELL GREEN, CATFORD, KENT.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

Second Edition, greatly Enlarged. Now Published, price 3s.,

GAS PURIFICATION IN LONDON.

By R. H. PATTERSON.

Late Metropolitan Gas Referee. Author of the "Science of Finance," &c.

PART I.

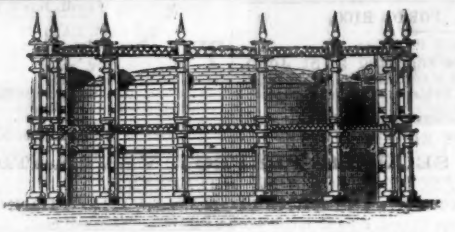
COMPLETE SOLUTION OF THE SULPHUR QUESTION.

PART II.

GENERAL REMARKS ON GAS PURIFICATION.

W. BLACKWOOD & SONS, Edinburgh and London.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.

The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.

W. J. WARNER, Engineer.

South Shields.

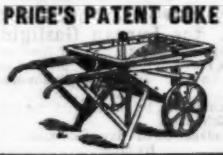
BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

PRICE'S PATENT COKE & COAL BARROW.



effecting a great saving of time, labour, and expense.

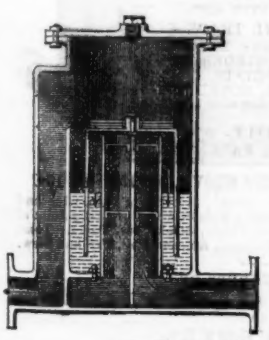
For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

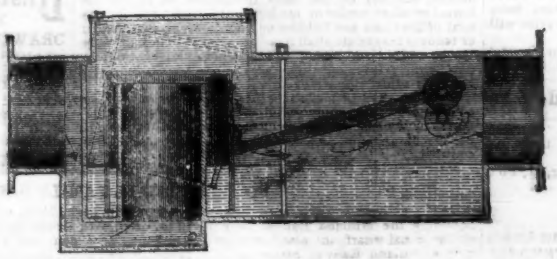
CAFFALL, THOMAS, & CO., LIMITED.

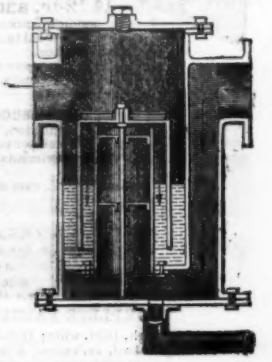
PATENT SELF-ACTING BYE-PASS VALVES

FOR

EXHAUSTER, GASHOLDER, CONDENSER, &c.







Models may be seen, and information obtained, at the Office,

28, GRACECHURCH STREET, LONDON, E.C.

PIPES.—A large stock of 3-in., 4-in., 6-in., and 8-in. Cast-Iron SOCKET and SPIGOT PIPES (usual weights) ready for immediate delivery, either f.o.b. or ex ship or steamer in the Thames.
Address the MANAGER, Milton Iron-Works, WEST HARTLEPOOL.

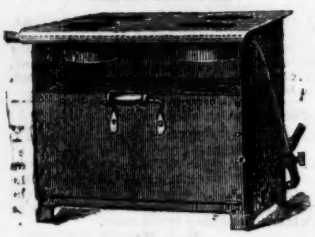
MR. NORWOOD EARLE, late of the Dover Gas-Works, is prepared, after 17 years experience, to undertake the duties of SURVEYOR to Gas Companies and Corporations in all matters relating to the Distribution of Gas and Gas Testing. Contracts entered into for the Survey of Mains, Services, Public Lamps, &c., in order to reduce the per centage of unaccounted-for gas to the lowest possible amount.
Valuations for Assessment, Transfer, and other purposes.
Arrangements made with Companies desiring the occasional use of an Office in the City.
12, QUEEN VICTORIA STREET, LONDON, E.C.

THE THAMES BANK IRON COMPANY,

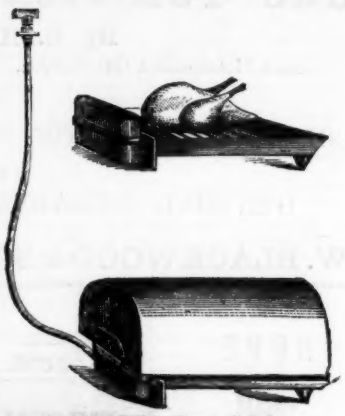
(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK
CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.
All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.
ADDRESS—
OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

THE ECONOMIC GAS-RANGE & ROASTER COMPANY,

TABLE ROASTER.

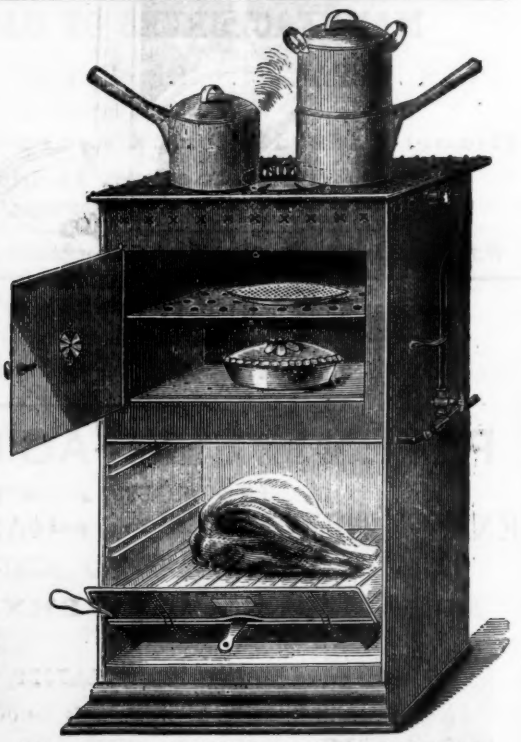

SMALL RANGE.

LARGE RANGE.


ROASTERS, Nos. 1, 2, & 3.

ON SOUTHBY'S PATENT, WHICH SECURES PERFECT VENTILATION.
A 7-lb. JOINT ROASTED TO PERFECTION FOR ONE HALFPENNY.
SELECTED BY THE COMMISSIONERS FOR THE ANNUAL INTERNATIONAL EXHIBITIONS, 1871 & 1873.
A pennyworth of gas, perfectly consumed and economized as it is under this Patent, does as much work as six pennyworth of coal. The peculiar arrangement of cannel fishtails in a chimney secures freedom from smoke even with the richest gas, and a positive immunity from every trace of smell. The simplicity in use is so great that no experience is required. Roasters from 12s. 6d. to £1 5s. Complete Ranges at £2 4s. for small families; £3 10s. for ordinary establishments; and £6 6s. for a Range equal in power to a large Kitchener. Estimates given for fitting up Hotels, Restaurants, and large Establishments.
Works: 2, BASSETT STREET, MALDON ROAD, KENTISH TOWN, N.W.,
Where the Apparatus can be seen in operation;
And at Mr. WOODCOCK'S Offices, 23, ABINGDON STREET, WESTMINSTER, where Mr. SOUTHBY can be consulted by appointment.

COMPLETE FAMILY GAS COOKING STOVE, No. 135. £5 5s.
Size, 36 in. high, 18 in. wide; Hot-Plate, 22 in. wide × 16 in. deep, with Three Burners for Boiling. If with Bright Rail, 5s. extra. For Roasting, Grilling, Baking, and Boiling. It is fitted with all the latest improvements, capable of cooking a dinner for five to ten persons.


SMALL FAMILY GAS COOKING STOVE, No. 139. £3 10s.
Size, 29 in. high, 15 in. wide, 10 in. deep. Hot-Plate, 16 in. wide and 13 in. deep, with air and gas ring burner. This Stove will Roast a Joint of 6 or 7 lbs., or a couple of Fowls; Grill Chops, Steaks, and Bacon; Toast Bread, Bake Pastry, Rice Puddings, Potatoes, &c., and Boil, Fry, and Stew.

MANUFACTURERS OF
ASBESTOS GAS FIRES
AND
SUN BURNERS.
BILLING & CO., 90, HATTON GARDEN, LONDON, E.C.

LONDON, 1862.

Class 13.

PARIS, 1867.

Classes 24 and 53.

LONDON, 1862.

Class 31.

WILLIAM SUGG,

GAS ENGINEER,

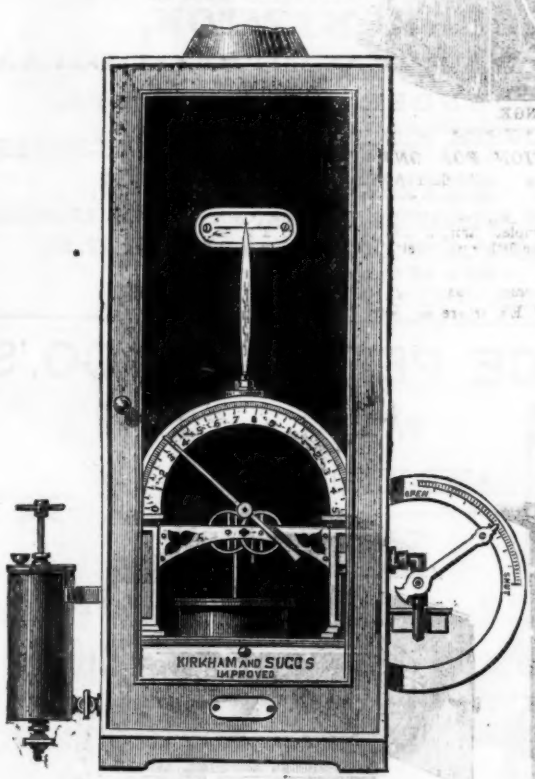
VINCENT WORKS, VINCENT STREET, WESTMINSTER.

SOLE MANUFACTURER OF

LOWE'S

JET PHOTOMETER

FOR SHOWING THE ILLUMINATING POWER OF GAS BY SIMPLE INSPECTION.



MANUFACTURER OF

STATION-METERS, STATION GOVERNORS, DRY GOVERNORS,

(For Regulating Pressure in Mains underground);

IMPROVED COMPENSATING WET METERS,

CONSUMERS DRY GOVERNORS.

(From 1 Light to 300 Lights);

PATENT STREET-LAMP REGULATORS,

PRESSURE INDICATORS, PRESSURE GAUGES,

TESTING HOLDERS,

"GAS REFEREES" CUBIC FOOT MEASURE.

PATENT "LONDON" ARGAND BURNERS.

"EVANS" and "LETHEBY" PHOTOMETERS, &c., &c.

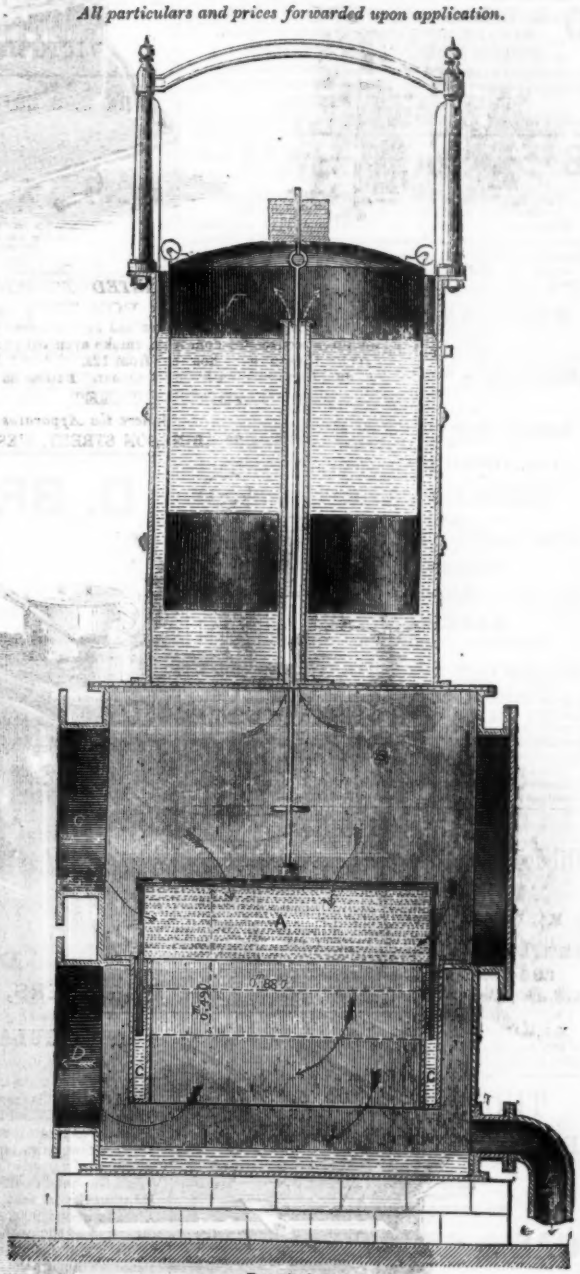
"MODERN STREET LIGHTING," price 1s. 7d., post free.

METHOD OF TESTING FOR AMMONIA AND SULPHUR AS PRESCRIBED BY GAS REFEREES," price 7d., post free.

AGENT FOR

PELOUZE & AUDOUIN'S CONDENSER.

All particulars and prices forwarded upon application.



Description.

A.—Condensing apparatus, properly so called.
B.—Chamber in which the apparatus moves.
C.—Inlet for gas.
D.—Outlet for gas after passing condensing apparatus.
E.—Outlet-pipe for condensed products terminated by a syphon.
F.—Regulator by means of which the number of perforated plates in use is varied according to the quantity of gas to be purified.
G.—Water space into which the apparatus dips.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water, gas, any steam mains and boilers, under pressure, without and escape of water, gas, or steam. The drills are made ¼ in. diameter and upwards. The price of ¼ in. is 1s. 3d. each; others in proportion.

Apply to CHARLES FORSTER COTTERILL, Finney House, Cannock, STAFFORD, Patentee.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,

HYDRATED PEROXIDE OF IRON (BOG OCHRE),

Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

FRANCIS RITCHIE & SONS,
BELFAST.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.

LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS,
&c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
NEAR
BLAYDON-ON-TYNE.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD
CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

EMILY GIBBONS,
Dibdale Fire-Clay Works & Colliery,
Near STOURBRIDGE.
(ESTABLISHED 1834.)
MANUFACTURER OF EVERY DESCRIPTION
OF
Burs, Lumps, Stays, Shields, Blast Furnace and other Bricks & GAS-RETORTS.
Red and Blue Clay Goods, Engineering and other Ironwork, and Fittings supplied.

N.B.—Above works having been recently enlarged, orders of any magnitude for HOME or EXPORT Trade will receive immediate attention.

THOMAS READ & CO.,
BRAZILIAN IRON-WORKS,
MALTON, YORKS,
MANUFACTURERS OF
GAS and WATER PIPES,
Bends, Tees, and Irregulars,
AND
GENERAL FOUNDERS.

ESTIMATES and PRICES on APPLICATION.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.

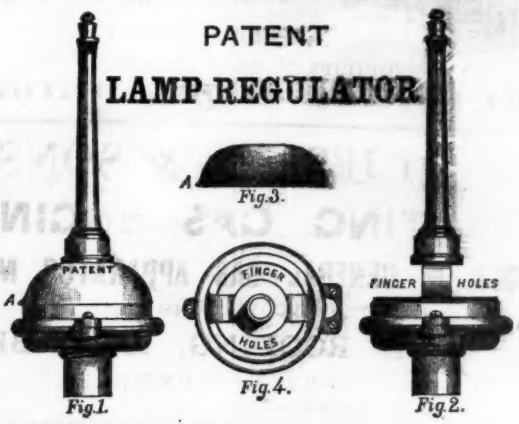
GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

SPENCE BROS. CHEMICAL COMPANY, LIMITED,
MANUFACTURERS OF
SULPHATE OF AMMONIA, VITRIOL, PATENT DRY COPPERAS, &c.
PURCHASERS OF
SPENT OXIDE AND AMMONIACAL LIQUOR;
AND CONTRACTORS FOR THE
PURIFICATION OF COAL GAS.
ALL COMMUNICATIONS TO
VICTORIA CHEMICAL WORKS, BRADFORD, MANCHESTER.

TO GAS COMPANIES, ENGINEERS, CONTRACTORS, AND OTHERS.

GEORGE NEWTON,
UNION STREET WEST, OLDHAM,
BRASS FOUNDER AND FINISHER,
MANUFACTURER OF
IMPROVED WET AND DRY CONSUMERS GAS-METERS,
LAMP METERS AND BOXES,
GOVERNORS, GAUGES, INDICATORS, EXHAUST & PRESSURE REGISTERS,
GAS STATION-METERS,
With all the joints planed.
TERMS, &c., ON APPLICATION.

D. BRUCE PEEBLES & CO.'S
PATENT
LAMP REGULATOR



D. BRUCE PEEBLES AND CO.,
ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,
PATENTEES OF
GAS REGULATORS FOR PUBLIC LAMPS, FACTORIES, PUBLIC HALLS, AND DWELLING-HOUSES.

Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—

"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."

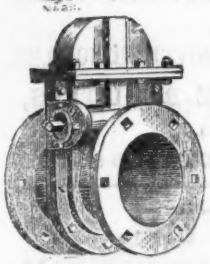
Since the above date, another 1000 have been supplied to Glasgow, and they are being largely adopted at home and abroad.

D. B. P. and Co. are prepared to Estimate for the Supply and Maintenance of their Regulators, and will be glad to forward terms on application.

D.BRUCE PEEBLES AND CO.,
ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,
FOUNTAINBRIDGE WORKS, EDINBURGH.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS,



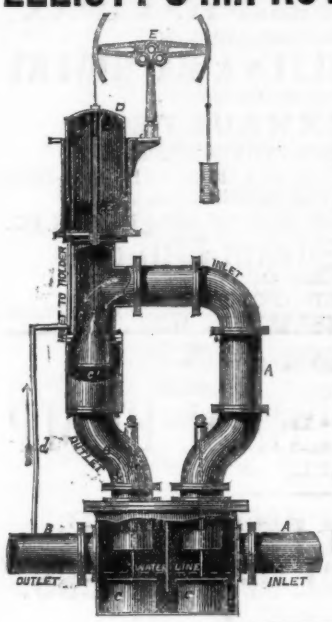
List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

VALVES MADE WITH OUTSIDE RACKS TO ORDER.
ALSO, SCREW WATER-VALVES WITH GUN-METAL FACES.
ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS.

B. DONKIN & CO.,
GENERAL ENGINEERS AND IRONFOUNDERS,
MAKERS OF STEAM-ENGINES,
BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

ELLIOTT'S IMPROVED STATION GOVERNOR.



The advantages of this Governor are—

1. The entre absence of oscillation.
2. No danger of explosion.
3. Perfect uniformity of pressure.
4. Economy of space; a 15-inch holder being sufficient for a 10-inch Governor.
5. The holder can be placed at any height in relation to the cone.
6. It admits of a simple, effective, and cheap bye-pass arrangement.

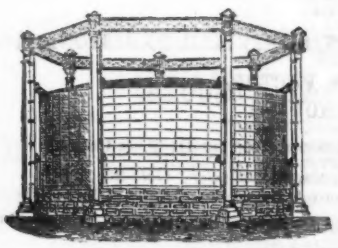
LIST OF PRICES.

For Governor only.		Governor, with Hydraulic Bye-Pass, complete.	
3 inch . .	£12 15 0	3 inch . .	£19 5 0
4 ,, . .	14 8 0	4 ,, . .	21 5 0
5 ,, . .	16 4 0	5 ,, . .	25 15 0
6 ,, . .	18 14 0	6 ,, . .	28 10 0
7 ,, . .	21 6 0	7 ,, . .	33 0 0
8 ,, . .	23 15 0	8 ,, . .	38 10 0
10 ,, . .	26 5 0	10 ,, . .	44 0 0
12 ,, . .	30 10 0	12 ,, . .	48 0 0

Prices for Larger Sizes on application.

ALL INQUIRIES TO BE ADDRESSED TO
J. ELLIOTT, STOURBRIDGE.

SAM. CUTLER & SONS,
CONTRACTING GAS ENGINEERS,
GASHOLDER & GENERAL GAS APPARATUS MAKERS,
MANUFACTURERS OF
BOILERS, IRON ROOFING, IRON BRIDGES,
AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers, and Purifiers**, of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF
VILLAGES, MANSIONS, FACTORIES, &c.

S. C. AND SONS undertake the **Supply** and **Laying** of **Mains for Gas and Water**, and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of these goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: **PROVIDENCE IRON-WORKS, MILLWALL, LONDON.**

THOMAS ALLAN & SONS, of Springbank Iron-Works, Glasgow, manufacture small cast-iron GAS AND WATER PIPES, 1½ to 6 inches, at their branch works, Stockton-on-Tees, and have at present a large stock, which they are open to sell at moderate prices

RICHARD THOMAS & CO.,
40, GRACECHURCH STREET,
Manufacturers of
EWELL FIRE-BRICKS, CLAY, AND CEMENT.
Warranted the best quality.
WORKS AT EPSOM.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS LAMBERT & SONS
MANUFACTURE EVERY DESCRIPTION OF
GAS AND WATER FITTINGS;
ALSO,
WROUGHT-IRON TUBES & FITTINGS.
SHORT STREET, LAMBETH, LONDON.

INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

HARRIS AND PEARSON,
STOURBRIDGE,
Proprietors of
BEST GLASS-HOUSE POT AND CRUCIBLE CLAY,
Manufacturers of
FIRE-BRICKS, GAS-RETORTS, & FIRE-CLAY GOODS
of every description.
Orders of any magnitude, for home and exportation, executed with all possible despatch.
N.B.—A quantity of Retorts in stock. Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in. D's, 15 in. by 13 in.; 16 in. by 12 in.; 18 in. by 14 in. 20 in. by 16 in.; 21 in. by 14 in.; and 24 in. by 14 in.

BOUCK & CO., LIMITED,
MANUFACTURING CHEMISTS,
TAR AND AMMONIA DISTILLERS, &c.,
MILES PLATTING, MANCHESTER.
WM. LITCHFIELD, SECRETARY.

CONTRACTORS for the PURCHASE of GAS TAR AND AMMONIACAL LIQUOR,
Also of their products.

HUTCHINSON BROTHERS,
ALBERT WORKS,
CHURCH STREET, BARNSLEY,
GAS ENGINEERS AND GENERAL COLLIERY FURNISHERS.
Plans, specifications, and estimates supplied, and contracts taken to furnish and erect Gas-Works complete, for supplying Manufactories, Collieries, Mansions, Halls, Railways, and other works.
Competent workmen sent out to town or country.
Agents for the supply of the best qualities of South Yorkshire House and Gas Coal. Prices and particulars on application.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Successors to
E. BAKER AND CO. LATE BRIERLEY HILL, STAFFORDSHIRE.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers' Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers and Steam Joints.
T. BUGDEN, Manufacturer,
79, GOSWELL ROAD, LONDON, E.C.

B. CARPENTER,

THE ORIGINAL MANUFACTURER OF

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

22, HERMES STREET, PENTONVILLE ROAD, LONDON, N.

TO GAS COMPANIES.

GEORGE McKAIG,

MANUFACTURER OF

GAS-PURIFYING WOOD SIEVES,

153, CLEVELAND STREET, DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

DEMPSTER'S

RENOWNED

WOOD SIEVES,

WITH TAPER BARS,

MADE BY MACHINERY

CAPABLE OF MAKING 10,000 FEET WEEKLY.

References to Hundreds of First-Class Engineers.

ROSE MOUNT IRON-WORKS

ELLAND, NEAR HALIFAX.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

INVERKEITHING,

(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c., to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his CELEBRATED HALBEATH STEAM COALS, on Navy List.

JAMES NEWTON & SONS.

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE, SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

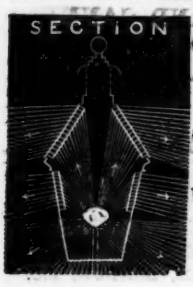
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.

AGENTS FOR THOMAS GLOVER & CO.'S

PATENT DRY GAS-METERS.

DELIVERY F.O.B. ON CLYDE.

Lists on application.



THE PATENT CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

GEORGE ORME & CO.,

GAS METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,

ATLAS METER-WORKS, OLDHAM.

CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.

STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,

And every Description of Gas Apparatus.

GAS, STEAM, AND WATER FITTINGS.

ROBERT DEMPSTER,

GAS ENGINEER AND CONTRACTOR,

ROSE MOUNT IRON-WORKS,

ELLAND, near HALIFAX,

MANUFACTURES AND EFFECTS

GAS APPARATUS & MACHINERY

OF EVERY DESCRIPTION.

GAS EXHAUSTERS,

WITH STEAM-ENGINES COMBINED.

DRY, CENTRE, AND BYE-PASS VALVES; WROUGHT-IRON AND CAST-IRON SCRUBBERS; ANNULAR AND PIPE CONDENSERS, ALL SIZES.

PURIFIERS from 4 to 40 FEET SQUARE.

Steam-Engines and Steam-Pumps.

RETORT SETTERS & FITTERS SENT TO ALL PARTS.

ALL WORK AND MATERIALS GUARANTEED OF THE BEST DESCRIPTION.

THE PATENT

"UNIVERSAL" STEAM PUMP

WAS AWARDED, AT THE

VIENNA EXHIBITION, 1873,

THE GRAND PRIZE "MEDAL OF PROGRESS."

OPINIONS OF

THE PRESS.

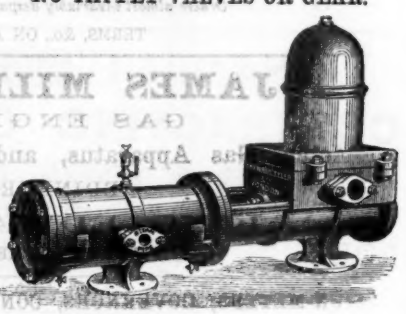
"The simplest machine of its kind."—*Engineering.*

"Remarkable for its simplicity and ease of action."—*Daily Telegraph.*

"None that we have noticed work so quietly."—*The Engineer.*

"Nothing invented in hydraulic steam power half so cheap and effectual."—*Griffith's Iron Trade Exchange.*

NO TAPPET VALVES OR GEAR.



IN USE IN SOME OF

THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,

FOR

TAR AND AMMONIACAL LIQUORS.

One selected from amongst many Testimonials received by H. T. & Co.:—

"*Ardwick Bridge Chemical Works, Manchester, Oct.* 28, 1872.

"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily.

"Yours truly,

(Signed) "PETER HART, *Manager.*"

SOLE MAKERS,

HAYWARD TYLER AND CO.,

84 and 85, UPPER WHITECROSS STREET, LONDON, E.C.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

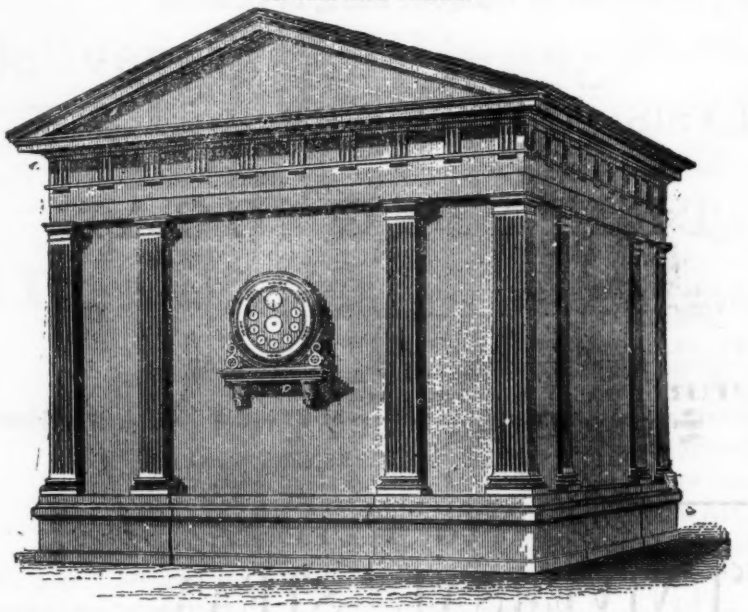
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

WATER-METERS SUITABLE FOR ALL PRESSURES.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artisan.*

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

THE

HUCKNALL COLLIERY COMPANY

Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12¾ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near LEEDS.

THE EARL OF HUME'S

LESMAHAGOW

MAIN SEAM CANNEL COAL.

CRAIGNETHAN GAS COAL CO.,

LESMAHAGOW, N.B.

Analysis and Price on Application.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

THE

WIGAN COAL & IRON COMPANY,

LIMITED,

COLLIERY PROPRIETORS,

(Head Offices: WIGAN, LANCASHIRE;

District Office: 18, BENNETT'S HILL, NEW STREET, BIRMINGHAM,)

Supply the Best Wigan Arley Mine Gas Coal and Nuts; the Best Hand-picked Round Cannel;

ALSO SMALL OR GAS CANNEL, &c., &c.

EVERY DESCRIPTION

OF

GAS COAL AND CANNEL

SUPPLIED BY

E. FOSTER & CO.,

COAL and CANNEL

MERCHANTS,

21, JOHN STREET, ADELPHI,

LONDON, W.C.

Prices Quoted on application.

LEE and JERDEIN,

COAL OWNERS & MERCHANTS.

Chief Office:

9, LANCASTER PLACE, STRAND, LONDON, W.C.

SOLE VENDORS FOR

LONDON & THE SOUTHERN COUNTIES

OF

WIGAN COAL AND CANNEL,

From the Mines of the

INCE HALL COAL & CANNEL COMPANY, Limited,

AND

Messrs. W. H. BRANCKER & Co.

E. GODDARD,

GAS-WORKS, IPSWICH,

SOLE AGENT FOR

EDGE'S PATENT

FOR REMOVING THE

CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

WILSONTOWN GAS COAL.

This Coal bears a close resemblance to the Lesmahago seam. It has a first-class Coke, equal to the Lesmahago, and greater in quantity, and 10,538 Cubic Feet of 33·2 Candle Gas.

For rail in Scotland, or shipped at Glasgow, Leith, or Granton.

ANALYSIS AND REPORT
ON
CLIMPY TRIPPING COAL,
FOR GAS PURPOSES.

THE results of this analysis, as shown below, were got from actual working, and we have therefore the utmost confidence in placing it, along with that annexed, before you.

COMMERCIAL RESULTS.

Gas per ton of Coal—temperature 60°—barometer 30 inches	10,200 cubic feet.
Coke per ton of Coal	1,400 lbs.
Durability of one cubic foot of the gas, by jet of 5-inch flame	48 min. 24 sec.
Illuminating power in standard candles	14·9

REMARKS.

Being well acquainted with Durham and Northumberland Coals, I have no hesitation in saying that "CLIMPY TRIPPING" is superior to any (containing, besides, a greater proportion of pieces from 7 to 14 lbs. weight), with far less impurities for purification, more gas, and coke equal in calorific power. It has a large mixture of cannel nuts, which accounts for the good quality of the gas, at our photometer in town, 1000 yards from the works.

It is also a very superior Coal for mixing with oils, as by Mackenzie's patent; or with acid tar, or tar oil, shale grease, or other refuse from paraffin-works, as by system of Mr. Scott, of Musselburgh, or Mr. Foster, Portobello, the Coal being easily crushed.

Below are the results realized by myself, when mixed with acid tar from paraffin work, received by me in a solid state, having been run on to very fine dross. My charges were 2 cwt. tripping and 28 lbs. of acid tar, each retort, running six hours; with lighter charges I get more gas, but not so good quality, or so much coke.

Gas per ton of Coal	10,800 cubic feet.
Coke per ton of Coal	1,540 lbs.
Durability of one cubic foot of gas, by jet of 5-inch flame	58 min. 28 sec.
Illuminating power in standard candles	27·29

The first truck received being tried with very light charges (unmixed), and running five hours, I got 10,500 cubic feet of 14-candle gas; and I am confident, practical managers, with good retort-fittings (mine being very inferior), and exhausters at work, as I have seen generally at home and abroad, will take 11,000 feet of 13-candle gas from it. My retorts are 8 feet × 2 feet × 14 inches, D shape, heavy dip, and no exhauster.

These remarks of mine you may perhaps think rather lengthy, but they will be the more intelligible to any manager inquiring for Climpy Tripping.

L. MONK,
Engineer and Manager.

Lanark Gas-Works, April 20, 1874.

GAVIN PAUL,
WILSONTOWN GAS COAL WORKS & CLIMPY COLLIERY,
BY CARNWATH, N.B.

G. J. EVESON,

GAS COAL MERCHANT,

STOURBRIDGE.

Delivery per Rail to any Part.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.

MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 3 per cent. of ash.

MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL
Yields 12,560 cubic feet of 33-candle gas per ton.
Prices and full Analyses on application.

ALBERT GAS COAL.

THE DERBYSHIRE
SILKSTONE COAL COMPANY,
LIMITED,
CAN OFFER A

GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO
Mr. EDMUND TAYLOR, Secretary,
ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

DUKINFIELD CANNEL COAL.

THE DUNKIRK COAL COMPANY.

OFFICES:

ASTLEY DEEP PIT, DUKINFIELD.

ANALYSIS, PRICES, AND OTHER INFORMATION, ON APPLICATION AT THE ABOVE OFFICES.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

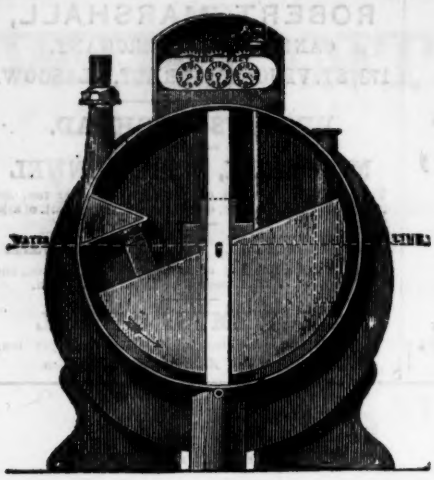
	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.



THE

UNVARYING WATER-LINE GAS-METER.

(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—THOS. G. BARLOW, C.E.

Over 90,000 in action.

MANUFACTURERS:

THE GAS-METER COMPANY,

KINGSLAND ROAD, LONDON;

WITH

Branch Manufactories at DUBLIN and OLDHAM.

ALEXANDER WRIGHT & CO.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS

of the highest excellence.

STATION-METERS AND GOVERNORS.

STREET-LAMP REGULATORS.

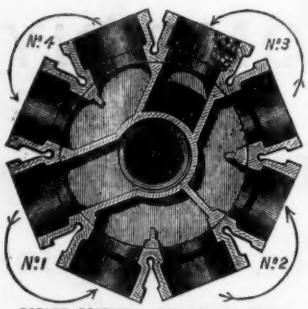
TESTING APPARATUS

of the most perfect description for all purposes relating to Gas.

NOW READY.

"GAS MEASUREMENT AND GAS-METER TESTING," by F. W. HARTLEY, A. Inst. C.E. Third Edition, cloth boards, 2s.; per post, 2s. 2d.

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW,

SOLE MAKERS OF

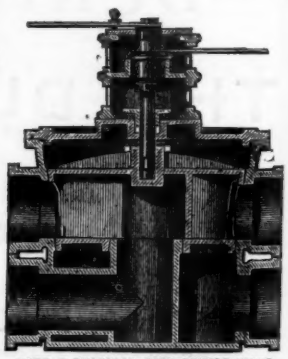
PATENT

RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Elevation.

LONDON OFFICE: 106, CANNON STREET.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR

Invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT IRON PIPE, BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—65s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern-Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, July 21, 1874.